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EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our

editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

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FRIDAY, FEBRUARY 9, 1906.

The Pennsylvania Railroad Company is prepared to build a railroad from the harbor of New York through the eastern part of the greater city to and across Long Island Sound, and so connecting with the New England railroad systems, and in connection with the tunnels under the North and East rivers, bringing Long Island, for the first time, into direct railroad communication with the rest of the world, and increasing the value of its real estate by scores, or more likely, by hundreds of millions of dollars. The New York city fathers, in their zeal for the city's interests, would make a condition for the permission of this enterprise that the Pennsylvania Railroad shall carry to New York from that part of the country west of Pittsburg all freight without any charge whatever for the 90 miles between Philadelphia and New York. The requirement that rates to New York shall not be higher than to Baltimore or Philadelphia amounts to just this for the Pennsylvania Railroad Company. The "equality" which would make it impossible to charge for the 758 miles from Cincinnati to New York more than for the 667 miles from Cincinnati to Philadelphia or for the 593 miles from Cincinnati to Baltimore might, it would seem, tempt the carriers to do what they can to favor exports through those more southern cities.

The legislature of Ohio is really going to pass a law limiting passenger fares to two cents a mile throughout the state, on large roads and small; or at least that appears to be the opinion just now of all good judges. For 15 years the proposition has been renewed in every legislature, but each time it has failed to get the necessary number of votes. Now, in consequence of the agitation at Washington concerning interstate rates, or of the agitation caused in pocketbooks by dearth of annual passes, the members of the legislature have formed a purpose which is more definite, intelligent and vigorous than anything known in past years, and they appear to be acting with sufficient harmony to accomplish their object. The proposed law is very crude, for there must be many thin roads on which the reduction of the rate—from, say, three cents—will have so little effect in stimulating traffic that it will be many years before the gross receipts will get back to their present volume. Such a reduction causes the maximum damage to the road and the minimum benefit to the public. As, however, the highest imaginable gross income from passengers on these roads—the weaker roads in thinly settled regions—is insufficient to pay passenger expenses and a fair share of the general expenses and interest, it is perhaps not a matter of great moment. The passenger business must, in most cases, be done at a loss in any event, and a smaller or a

greater loss makes no alarming difference. At any rate, we may be sure that this will be the reasoning of the average legislator—if he knows the facts and reasons on the subject at all. An eel gets used to being skinned at last; and after 15 years the railroads of Ohio must be measurably prepared for a change. Indeed, some of them had about concluded ten years ago that a general two-cent rate might have its compensations. The application of the two-cent rate to all tickets would enable the railroads to abolish the 1,000-mile ticket—which the late J. F. Goddard declared was always and incurably an evil. The G. P. A., who threatens if the law is passed to abandon low-rate excursions, may or may not mean what he says. If he refers to the ambitious affairs in which he borrows cars from 500 miles away and aims merely at the gross receipts for a single day, it is to be hoped that he will carry out his threat, for he neither makes money for the road nor promotes the real happiness of the public. But as regards the short-distance excursions, which utilize cars otherwise idle, and gives the slow people brief outings after the fast people have got tired of traveling, we advise the legislators not to be scared. Such excursions have both popularity and profit to recommend them.

THE PARK AVENUE CASES.

In our issue of April 21, 1905, we reviewed at some length the decision of the Supreme Court of the United States in the Muhlker case. The point at issue—the liability of the New York & Harlem and New York Central & Hudson River railroads for easement damages occasioned by the track elevation on Park avenue, New York City—has again been ruled on by the Supreme Court in the case of Anna Siegel and others, plaintiffs in error, versus the New York & Harlem Railroad and the New York Central & Hudson River Railroad. The Supreme Court has now reversed the Court of Appeals, holding it to have been in error, and basing its decision on the Story case of 1890, which the Muhlker decision last spring reversed. The subject is important and interesting as dealing with doubtful points of law and affecting large sums of money, and the decisions of the courts have been tossed back and forth, year after year, without seeming to rest on any firm ground. Our review of the Muhlker case was sufficiently full so that it is only necessary at the present time to recite the main points. Mr. Muhlker, like the present plaintiffs, was a property owner on the portion of Park avenue above which the elevated tracks of the New York Central Railroad run. He brought action against the company to recover damages, and the Supreme Court of the State of New York sus-

tained him. An appeal to the Appellate Division of that court affirmed this judgment, but the Court of Appeals, the tribunal of last resort in the state, reversed the decision of the Appellate Division, and the case then went to the Supreme Court of the United States. The Supreme Court first ascertained that the law of New York, as settled by the elevated decisions beginning with the Story case, recognized the right of an abutting property owner to light, air and access, as easements appurtenant to his premises. Starting from this principle, the Court planted itself upon the Constitution of the United States, which prohibits the taking of private property for public use without compensation, and as the record showed that these easements of private property had been taken from Muhlker by the erection and operation of the structure without compensation, the act was void as to him, whether perpetrated by the state or by the defendant companies.

In analyzing this decision it is necessary to keep in mind the very unusual circumstances which attended the building of the elevated structure on Park avenue—circumstances which would seem to the layman, and which have seemed to many inferior courts, to differentiate it entirely from the Manhattan elevated cases. When the Harlem Railroad was chartered in 1832, Park avenue did not exist except on a layout map. The charter provided that if the railroad company should lay out a line along the street, open or proposed, it must first get permission from the city. This was done. The railroad also obtained deeds from the property owners for its right of way. These deeds purported to give fee for 24 feet in the center of the avenue, with necessary slopes and banks on the sides, but not to exceed the full width of the avenue, which was plotted on the map at 100 feet, across the large tracts of farming lands which then occupied the territory north of the city as it existed at that time. The railroad was built in 1835, 1836 and 1837 as far as the Harlem river; then the avenue was widened to 140 feet, at that time the widest street in the city, on account of the railroad.

In the early '50s the city commenced a regular proceeding to open Park avenue from 38th street to the Harlem river. In 1872 an "Act to improve Park avenue" was passed. All grade crossings were removed, the tunnel was built, and four tracks were authorized, making a railroad structure 58 feet wide, with a roadway on each side.

The troubles of the railroad began when Congress decided that the insignificant Harlem river, already a handicap to the growth northward of New York, must be maintained as a navigable stream, and that all bridges must be raised to 24 feet above mean spring tides. It is fair to say at once that the sacredness of a navigable stream in the eyes of the government has often been a very expensive thing for all concerned, and perhaps never more so than in this case. In order to provide for the quite inconsequential traffic of that river the city has probably spent \$20,000,000, at the least, for bridges, and railroad traffic has always been seriously handicapped. About 1890 the New York Central engineers, in accordance with a ruling of Congress, made a plan to raise their Harlem bridge and tracks, with an elevation to extend only as far back as 125th street. A bill to further this plan was passed by both houses of the legislature, but was then allowed to die by mutual consent. A year or so after that, property owners and the railroad got together, and it was agreed that the city should bear half the expense of raising the tracks southward to 106th street, but that the city's share should not exceed one-half of \$1,500,000. The bill to accomplish this was passed by the legislature, so that the track raising was done strictly by state order, and the railroad, which spent \$3,000,000 as its share of the improvement, obtained thereby a roadbed not as good as it had before, although there were two slight benefits, one of which was that the new bridge, on account of its greater height, did not have to be turned as often as formerly; the other, that one grade crossing north of the bridge was removed.

Immediately after this improvement, fostered by property owners and ordered by the state, was completed, the property owners began their suits. In 1900, in the Lewis case, the Court of Appeals took the remarkable position that the changes in the avenue were made for the benefit of the public at the instance of the state by a governmental agency, and that the railroad companies had no authority or control over the work and could not be responsible for it; that if the Harlem and New York Central railroads had never used the viaduct they had been compelled to build, they would never have been liable for damages, but the court held that their liability began with that use and continued therewith, although the statute authorized and directed the companies to use the tracks on the viaduct when completed. The manifest absurdity of such a

position was recognized by the court itself in the subsequent appeal in the Fries case, where the Court of Appeals reversed itself and held that the railroads were liable neither for the construction nor for the use of the new viaduct, although this decision was given by a divided bench. The progress of the law was this, then: That in the first important case the railroad was held free of liability for building the viaduct under compulsion, but was penalized for running over it after it was built; that in the second important case the railroad was held entirely free of responsibility, while in the third legal landmark—the Muhlker case—the position of the railroad was entirely ignored, and the attention of the court was directed only to the property owner, who had apparently had something taken away from him without compensation.

The briefs which have been filed in these cases are so voluminous and the information at hand is so extensive that it is fair to say, after all these decisions and reversals, appeals and divided benches, that not much is really settled from an equitable standpoint except that the railroad has been a consistent loser by state order, and that the cost of providing a modern transportation system into the greatest city of the country, presumably a benefit mutually to the state, to the railroad and to the municipality, has been principally paid for both in the first instance and in subsequent damage claims by only one of the parties of interest, while other parties of interest have not alone been content to evade their natural and equitable share in the cost but have been quick to seize the opportunity on legal technicalities to derive damage benefits from the railroad. The great and fundamental difference between the Park avenue viaduct and the Manhattan elevated cases is that the steam railroad was the first comer in its territory, and, as was pointed out in one of the court decisions, property owners who built alongside its tracks after the railroad was there must necessarily have discounted the effect of the tracks in the price which they paid for their real estate; while in the street elevated road cases the structure, with its unquestioned damages to adjacent property, was a late comer, built after the houses and shops which line the streets had been placed there. As was stated in the decision in the Muhlker case, when the elevated railroads were built no attempt was made by the state to improve the street for the benefit of the public. Instead, it granted to a corporation the right to make an additional use of the street, in the doing of which it took certain easements belonging to abutting owners for which it was compelled to compensate them, as the court in this case held that the New York & Harlem Railroad Company was not vested with any title in Park avenue that permitted it as the owner of real estate to erect its elevated structure without regard to the injury it might work upon the easements of light, air and access enjoyed by abutting owners, and the court decided that the railroad must settle for damages caused by so much of the structure as exceeded established uses.

One advantage of being able to review a legal suit from the standpoint of a layman is that it is permissible to look at the subject all at once, and not bit by bit, in decisions built up through the structure of the courts. The recent Supreme Court decision, which will cost the New York Central Railroad some millions of dollars in damages, apparently without redress, when viewed in this way, presents an aspect of obvious injustice. The non-legal mind cannot pretend to tell where this injustice lies; it only realizes that it exists; since on one side property owners obtain large damages on account of easements which they doubtless never expected to have when they bought the property, while on the other side the railroad pays the cost of doing what the state orders it to do, and likewise pays for the speculative ventures of citizens who are presumably equally benefited with the rest of the community by the establishment of a through, safe connection between New York and the rest of the world.

RECORD OF THE PENNSYLVANIA LOCOMOTIVE TESTS.

The final record of the locomotive tests made by the Pennsylvania Railroad system at the Louisiana Purchase Exposition in 1904 has just been published in a book of some 750 pages, which contains all the data, conclusions, etc., obtained from the tests, together with adequate descriptions of apparatus, exhibits, etc., of that road at the exposition. This work is perhaps the most exhaustive treatise of its kind ever published, and as previously noted in these columns, the tests and the record of them will doubtless endure as an intellectual monument to the enterprise and scientific spirit of the Pennsylvania Railroad System. The tests will bear the same relation to the St. Louis Exposition that the International boiler tests bear to the Centennial Exposition held in 1876. The

art of locomotive construction has been materially advanced by reason of these tests. They have demonstrated the practicability of the testing plant as a means of studying the performance of locomotives; they have established a logical method of conducting tests and of making the necessary observations; and they have determined the efficiency and the limits of power which may be expected from the modern locomotive. Furthermore, they have pointed out the lines along which further investigations should be continued, and as stated in the concluding paragraphs of the book it is the purpose of the Pennsylvania to establish this testing plant at Altoona and make it a part of the permanent organization of the testing department.

The shortness of the time allotted to the tests as well as the unavoidable delays incident to work of this sort made it impossible to test more than eight locomotives. Such tests as were made, however, were very complete and carefully conducted so that the results obtained can be relied upon. Four of the locomotives tested were designed for freight service, and four were for passenger service. Of the freight locomotives, two were simple, one was a two-cylinder cross-compound, and one was a four-cylinder tandem compound. The passenger locomotives were all of the four-cylinder balanced compound type, although each was a representative of a particular system of compounding. It was the original intention to also test simple passenger locomotives, but shortness of time prevented. The tests of the balanced compounds show that, if properly designed, they are economical in fuel consumption as well as non-destructive to the track. It is necessary, however, to design the parts with great care, and carefully calculate the weights and disposition of the several moving parts, otherwise the unbalanced forces, even in the four-cylinder balanced arrangement may become excessive. It is noteworthy that the two American designs of balanced compounds gave better results than either of the foreign-built locomotives. Of course, the Hannover locomotive gave a lower steam consumption under certain conditions than the others, but this locomotive was fitted with a Pielock superheater. The de Glehn and the Hannover, and especially the latter, had a very narrow range of economical working.

The final chapter of the book gives a summary of conclusions from the tests, and while these conclusions by no means cover a complete statement of the entire results obtained from the tests, they nevertheless serve to indicate some of the more important facts which have been learned. These conclusions are as follows:

BOILER PERFORMANCE.

1. Contrary to a common assumption, the results show that when forced to maximum power, the large boilers delivered as much steam per unit area of heating surface as the small ones.

2. At maximum power, a majority of the boilers tested, delivered 12 or more lbs. of steam per square foot of heating surface per hour; two delivered more than 14 lbs.; and one, the second in point of size, delivered 16.3 lbs. These values expressed in terms of boiler horse-power per square foot of heating surface are 0.34, 0.40 and 0.47, respectively.

3. The two boilers holding the first and second place with respect to weight of steam delivered per square foot of heating surface, are those of passenger locomotives.

4. The quality of steam delivered by the boilers of locomotives under constant conditions of operation is high, varying somewhat with different locomotives and with changes in the amount of power developed, between the limits of 98.3 per cent. and 99.0 per cent.

5. The evaporative efficiency is generally maximum when the power delivered is least. Under conditions of maximum efficiency, most of the boilers tested evaporated between 10 and 12 lbs. of water per pound of dry coal. The efficiency falls as the rate of evaporation increases. When the power developed is greatest, its value commonly lies between limits of 6 and 8 lbs. of water per pound of dry coal.

6. The observed temperature of the firebox under low rates of combustion lies between the limits of 1,400 degrees F. and 2,000 degrees F., depending apparently upon characteristics of the locomotive. As the rate of combustion is increased, the temperature slowly increases, maximum values generally lying between the limits of 2,100 and 2,300 degrees F.

7. The smoke-box temperature for all boilers, when worked at light power, is not far from 500 degrees F. As the power is increased, the temperature rises, the maximum value depending upon the extent to which the boiler is forced. For the locomotives tested, it lies in most cases between 600 and 700 degrees.

8. With reference to grate area, the results prove beyond question that the furnace losses due to excess air are not increased by increasing the area. In general, it appears that the boilers for which the ratio of grate surface to heating surface is largest are those of greatest capacity.

9. A brick arch in the firebox results in some increase in furnace temperature and improves the combustion of the gases.

10. The loss of heat through imperfect combustion is in most cases small, except as represented by the discharge from the stack of solid particles of fuel.

11. Relatively large firebox heating surface appears to give no advantage either with reference to capacity or efficiency. The fact seems to be that the tube heating surface is capable of absorbing such heat as may not be taken up by the firebox.

12. The value of the Serpentine tube over the plain tube of the same outside diameter, either as a means for increasing capacity or efficiency, was not definitely determined.

13. The draft in the front-end for any given rate of combustion as measured in inches of water, depends upon the proportions of the locomotive and the thickness and condition of the fire. Under light power, its value may not exceed an inch, but it increases rapidly as the power is increased. Representative maximum values derived from the tests lie between the limits of 5 inches and 8.8 inches.

14. Insufficient openings in the ash-pan and the mechanism of the front end, especially the diaphragm, are shown by the tests to lead to the dissipation of considerable portions of the draft force.

THE ENGINE.

15. The indicated horse-power of the modern simple freight locomotive tested, may be as great as 1,000 or 1,100; that of a modern compound passenger locomotive may exceed 1,600 horse-power.

16. The maximum indicated horse-power per square foot of grate surface lies, for the freight locomotives, between the limits of 31.2 and 21.1; for the passenger locomotives, between the limits of 33.5 and 28.1.

17. The steam consumption per indicated horse-power hour necessarily depends upon the conditions of speed and cut-off. For the simple freight locomotives tested, the average minimum is 23.7. The consumption when developing maximum power is 23.8, and when under those conditions which proved to be the least efficient, 29.0.

18. The compound locomotives tested, using saturated steam, consumed from 18.6 to 27 lbs. of steam per indicated horse-power hour. Aided by a superheater, the minimum consumption is reduced to 16.6 lbs. of superheated steam per hour.

19. In general, the steam consumption of simple locomotives decreases with increase of speed, while that of the compound locomotives increases. From this statement it appears that the relative advantages to be derived from the use of the compound diminish as the speed is increased.

20. Tests under a partially opened throttle show that when the degree of throttling is slight, the effect is not appreciable. When the degree of throttling is more pronounced, the performance is less satisfactory than when carrying the same load with a full throttle and a shorter cut-off.

THE LOCOMOTIVE AS A WHOLE.

21. The percentage of the cylinder power which appears as a stress in the draw-bar, diminishes with increase of speed. At 40 revolutions per minute, the maximum is 94 and the minimum 77; at 280 revolutions per minute, the maximum is 87 and the minimum 62.

22. The loss of power between the cylinder and draw-bar is greatly affected by the character of the lubricant. It appears from the tests that the substitution of grease for oil upon axles and crank pins increases the machine friction from 75 to 100 per cent.

23. The coal consumption per dynamometer horse-power hour, for the simple freight locomotives tested, is at low speeds not less than 3.5 lbs. nor more than 4.5 lbs., the value varying with running conditions. At the highest speeds covered by the tests, the coal consumption for the simple locomotives increased to more than 5 lbs.

24. The coal consumption per dynamometer horse-power hour, for the compound freight locomotives tested is, for low speeds, between 2.0 and 3.7 lbs. Results at higher speeds were obtained only from a two-cylinder compound, the efficiency of which under all conditions is shown to be very high. The coal consumption per dynamometer horse-power hour for this locomotive at the higher speeds increases from 3.2 to 3.6 lbs.

25. The coal consumption per dynamometer horse-power hour,

for the four compound passenger locomotives tested, varies from 2.2 to more than 5 lbs. per hour, depending upon the running conditions. In the case of all of these locomotives, the consumption increases rapidly as the speed is increased.

26. A comparison of the performance of the compound freight locomotives with that of the simple freight locomotives is very favorable to the compounds. For a given amount of power at the draw-bar, the poorest compound shows a saving in coal over the best simple which will average above 10 per cent., while the best compound shows a saving over the poorest simple which is not far from 40 per cent. It should be remembered, however, that the conditions of the tests, which provide for the continuous operation of the locomotives at constant speed and load throughout the period covered by the observations, are all favorable to the compound.

27. It is a fact of more than ordinary significance that a steam locomotive is capable of delivering a horse-power at the draw-bar upon the consumption of but a trifle more than 2 lbs. of coal per hour. This fact gives the locomotive high rank as a steam power plant.

28. It is worthy of mention that the coal consumption per horse-power hour developed at the draw-bar by the different locomotives tested presents marked differences. Some of these are easily explained from a consideration of the characteristics of the locomotives involved. Where the data is not sufficient to permit the assignment of a definite cause, there can be no doubt but that an extension of the study already made will serve to reveal it.

An apparently well-informed correspondent of the *Journal* of the German Railroad Union gives an account of the motives and aims of the organization of Russian railroad employees which has caused so much confusion in the empire by striking. There are nearly a million employees on some 39,000 miles of railroad. With a force as efficient as that in Western Europe, this mileage ought to be well worked with half that number. Most of these, of course, are in the lower grades. The average pay of a track hand is \$108 per year, that of a track watchman \$89, of women (at crossings, etc.) \$72, of switchmen \$90; of firemen, enginemen, conductors and yardmen (lumped together by this correspondent), \$194; station-masters, an average of \$28 a month; bookkeepers, etc., \$13 to \$21 a month. In the offices clerks get \$155 to \$465 a year. There is no allowance for clothing or rent, which some of the higher employees get. The men may be required to work extra time without additional pay. The dissatisfaction of the men is indicated by the fact that these grades of employees spend on the average only five years in railroad service. They either find some other employment or are discharged for gross negligence. Gross misdemeanors, such as withholding money collected, selling tickets and thefts of freight, extending sometimes to whole carloads, are common subjects of prosecution in the criminal courts. The organization of employees has formulated its demands, which are doubtless beyond possibility of immediate realization, though most of them may reasonably be striven for. The men have little experience in organization or in proportioning their demands to what it is practicable to obtain, and are easily led to accept the schemes of socialists whose inspiration comes from Germany or France. They cannot command means enough to enable them to leave work for any considerable length of time.

The witticisms of the head-line artist constitute the most pleasing part of some issues of certain papers, for example the *New York Sun*; but now and then he tries too hard and turns the joke on himself. A press despatch from Lima, Ohio, Feb. 3, says that "mistaking the head-light of a freight locomotive standing on its passing track for southbound accommodation No. 9, Engineer Moses Tyler, of the Cincinnati-Detroit Limited, on the Cincinnati, Hamilton & Dayton, dashed into the accommodation train a quarter of a mile further on. Both engines were demolished and Tyler and several passengers were injured." This item is headed, "Head-light Fooled the Engineer," which would seem to indicate that the news editor himself was fooled; fooled into thinking that enginemen have to depend on the presence or the character of a head-light for their knowledge of whether or not it is safe to run past a meeting station. The simple duty of the engineman is to learn the numbers of the engines (or trains) that he meets; and at a place where he is liable to meet a train (passenger) which has as good a right to the road as he himself has, he must, if necessary, bring his train to a stop and go and take a close view of the number of each engine that he sees, until he makes sure that the one which he is looking for either is or is not at that station. If it is there he can go on; if it is not there, he must follow the orders which he has, telling him on what conditions, or after what time, he may proceed regardless of the opposing train. Poking fun at the engineman who makes a mistake in this matter would

perhaps be legitimate amusement, if it were not so tragic. In the last case that we recall where an engineman was thus "fooled" seven persons were killed.

The Swiss State Railroads have made a contract with Brown, Boveri & Co., who are the contractors for building the Simplon tunnel, for an experimental electrical equipment of the tunnel, to be in working order by June 1 next. The motors (alternating current) must be able to haul passenger trains weighing 660,000 lbs. through the tunnel at a speed of 42 miles an hour and freight trains weighing 880,000 lbs. at a speed of 21 miles an hour, and the tracks and signals must be arranged to permit two trains to pass in each direction within the tunnel at the same time. The firm, if the equipment works satisfactorily, will conduct the train service for one year. Should the equipment not be ready or not work satisfactorily by June 1, the State Railroads will take over the tunnel and conduct the traffic with steam locomotives. The new line from Iselle, the Italian entrance to the tunnel, to Dornodossola, which has several tunnels, and one long one, is outside of the jurisdiction of the Swiss State Railroads, but the contractors agree to make an offer to the Italian authorities to equip and work that line also, in accordance with the original intention that locomotives should run through between Domodossola and Brieg, the Swiss entrance to the tunnel. The engineers declare that the water power used for excavating the tunnel is adequate for developing the electricity to work the railroad. Visitors to the Milan Railroad Exhibition, which is to be opened next May, will, it is hoped, have an opportunity to observe this electrical instalment.

Announcement is made of the establishment at the University of Illinois of a comprehensive school of railroad engineering and administration which will be open for work next September. It will have three departments intended to cover the entire range of railroad work. The problems of construction and maintenance of way, including track both for steam and electricity, will be treated in one division. Power and its application and all that is ordinarily included under mechanical and electrical engineering as applied to railroad problems will be treated in another division. The problems of operation, of organization, financing, rate-making, and everything which has to do with the actual formation and management of a railroad company will be treated in a third. It is intended to cover the entire field of railroad service, so that anyone who wishes to enter railroad employment in any branch of railroad engineering or management will find an opportunity to prepare himself especially for that work. This distinct and adequate recognition by a leading engineering college of the unique place occupied by the railroads in our modern system of industry is most encouraging. Aside from the special faculty organized to give instruction in these various departments, prominent railroad officials from the various branches of service will be engaged for special lectures and special courses in order to emphasize the increasing value of the practical features of the curriculum.

NEW PUBLICATIONS.

Manual of Recommended Practice for Railway Engineering and Maintenance of Way, 1905 edition. Published by the American Railway Engineering and Maintenance of Way Association, Chicago, Ill. Cloth, 175 pages; 6x9 in. Price, \$3.00.

At the fifth annual convention of the American Railway Engineering and Maintenance of Way Association, March, 1904, it was decided to publish a manual of the recommended definitions, specifications, and principles of practice adopted by the Association from year to year after consideration of committee reports submitted on the various subjects included within the scope of the Association's work. This volume is the first edition of the manual, and it is to be supplemented or revised annually after each convention. Particular care has been exercised to include in the book only such matter as has been carefully considered by the Association prior to its adoption by vote so that the manual represents only the approved practice recommended by the Association. The specifications and principles of practice are in the nature of recommendations only and are not binding on the members or railroads which they represent.

The subjects for which recommendations are laid down include Roadway, Ballasting, Ties, Rail, Track, Buildings, Masonry, Signs, Fences, Crossings, Cattle-Guards, Signaling and Interlocking, Records, Reports and Accounts, Water Service, Yards and Terminals, Iron and Steel Structures.

As showing the sphere of influence of the Association a separate pamphlet has been published giving a list of railroads represented and a table of membership classified by the positions or occupations of the 495 members. Of the 207,977 miles of railroad in the United States, December, 1904, 170,883 miles, or about 85 per cent., are represented in the Association, and in addition roads having a mileage of 27,980 located outside of the United States are represented. Extracts from a number of letters are included

in the pamphlet showing the wide extent to which the recommended practice of the Association has been adopted by various railroads as standard.

TRADE CATALOGUES.

In 1894, the Master Car Builders' Association, for convenience in the filing and preservation of pamphlets, catalogues, specifications, etc., adopted a number of standard sizes. The advantages of conforming to these sizes have been recognized, not only by railroad men, but outside of railroad circles, and many engineers make a practice of immediately consigning to the waste basket all catalogues that do not come within a very narrow margin of these standard sizes. They are given here in order that the size of the publications of this kind, which are noticed under this head, may be compared with the standards, and it may be known whether they conform thereto.

Standards.		
Postal-card circulars	3 1/2 in. by 6 in.	6 1/4 in.
Pamphlets and trade catalogues	3 1/2 " by 6 "	6 1/4 "
Specifications and letter paper	9 " by 12 "	10 1/2 "

Electric Hoists and Bridge Riveters.—The General Pneumatic Tool Company, New York, is publishing a series of cards descriptive of its products. Hoist Card No. 1 and Riveter Card No. 1 are now being distributed. The hoist card illustrates and describes more or less in detail the Shepard electric hoist, and the riveter card contains illustrations and a brief description of the various designs of Shepard pneumatic bridge riveters.

Automatic Slack Adjuster.—Full detailed drawings and a clear description of the "American Automatic Slack Adjuster" are given in a 24-page pamphlet published by the American Brake Company, St. Louis, Mo.

CONTRIBUTIONS

Deterioration of Spikes in Black Oak.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Cumberland, Md., Jan. 23, 1906.

The accompanying photograph shows track spikes which were used in black oak ties about four years. This condition existed over about two miles of track located in a narrow valley where fogs were prevalent. The black oak ties were mixed in amongst the white oak ties in which the spikes showed no sign of deterioration,



Spikes Removed from Black Oak Ties After Four Years' Service.

while the spikes in the black oak ties were affected about as shown in the photograph. Can you offer any explanation as to the probable cause of this action?

J. R. LEIGHTY,

Division Engineer, Baltimore & Ohio.

[It seems probable that the inferior texture of black oak as compared with white oak permits moisture to gather around the spike. We should be glad to have the opinion of other correspondents to show whether or not this experience has been general, and whether black oak in a moist climate has chemical properties that are injurious to spikes.—EDITOR.]

The Cost of Locomotive Operation.

New York, Feb. 3, 1906.

TO THE EDITOR OF THE RAILROAD GAZETTE:

On page 112 of your issue of Feb. 2 I notice an error which crept into the manuscript of my article on "Cost of Locomotive Operation." At the bottom of the first column, the saving should be 30 cents per 1,000 revenue ton-miles, instead of 7 or 8 cents, as, if the lading were one-half the total train weight, the cost would be $2 \times .50 = 1.00$ on 1 per cent. grade and $2 \times .35 = .70$ on $\frac{1}{2}$ per cent., a difference of 30 cents in favor of the low grade line. This would be a saving of $1,500 \times .30 = 450$ per day, or \$135,000 per year, which is 4 per cent. of \$3,375,000, instead of \$900,000, to represent the increased capital expenditure which would be permissible under the assumed traffic conditions.

G. R. HENDERSON.

Railroad Mileage of the World.

The number of miles of railroad in the six grand divisions of the world at the end of the year 1903, as tabulated by the *Archiv für Eisenbahnwesen*, was given in the *Railroad Gazette* of June 30, 1905, page 749; but as the mileage of individual countries is a figure frequently sought after, we print below the detail tables. The Bureau of Statistics at Washington has reprinted these tables, in its November *Summary*; and the statistics of area and population of countries which we give are taken from the *Summary*. In many instances these figures differ slightly from those in other translations from the *Archiv*, but not in any case to a sufficient degree to materially alter the averages which a railroad statistician would use.

Country.	Area, sq. miles.	Popula- tion.	Miles of railroad.			
			Total.	P.c. inc. since 1899.	Per 100 sq. miles.	Per 10,000 popu- lation.
Europe.						
Germany	208,830	58,549,000	33,819	8	16.2	5.8
Austria-Hungary	261,035	48,300,000	24,120	7	9.2	4.9
Gr. Britain & Ireland	121,371	42,371,000	22,461	3	18.5	5.3
France	207,054	38,962,000	28,102	7	13.6	7.2
Russia (incl. Finland)	2,095,616	119,925,000	33,093	15	1.6	2.8
Italy	110,646	32,475,000	9,966	2	9.0	3.1
Belgium	13,373	6,694,000	4,237	10	37.3	6.3
Netherlands ¹	13,646	5,668,000	2,095	6	15.4	3.7
Switzerland	15,976	3,356,000	2,576	10	16.1	7.7
Spain	194,783	18,618,000	8,607	4	4.4	4.6
Denmark	15,360	2,465,000	1,963	11	12.8	8.0
Norway	124,130	2,263,000	1,456	18	1.2	6.4
Sweden	172,876	5,199,000	7,697	16	4.5	14.3
Servia	18,630	2,536,000	359	..	1.9	1.4
Roumania	50,700	5,913,000	1,974	3	3.9	2.3
Greece	25,014	2,434,000	643	7	2.6	2.6
European Turkey ²	102,550	9,875,000	1,953	3	1.9	2.0
Malta, Jersey & Man.	402	348,000	69	..	17.2	2.0
Total Europe ...	3,786,030	411,380,000	186,678	8	4.9	4.5
America.						
United States	3,025,600	80,372,000	207,932	10	6.9	25.9
Canada	3,048,710	5,457,000	19,074	11	0.6	35.0
Newfoundland	40,200	217,000	656	11	1.6	30.2
Mexico	767,060	13,545,000	10,356	22	1.4	7.6
Central America	172,449	4,242,000	946	31	0.5	2.2
Cuba	43,000	1,573,000	1,583	..	3.7	10.1
Santo Domingo	18,045	610,000	117	..	0.6	1.9
Hayti	10,204	1,294,000	140	..	1.4	1.1
Jamaica	4,424	785,000	185	..	4.2	2.4
Porto Rico	3,606	953,000	137	..	3.8	1.4
Martinique	380	204,000	139	..	36.6	6.8
Barbados	166	198,000	58	..	34.9	2.9
Trinidad	1,868	274,000	88	..	4.7	3.2
Colombia	504,773	4,000,000	400	10	0.8	1.0
Venezuela	593,940	2,445,000	634	..	0.1	2.6
British Guiana	90,500	278,000	76	..	0.08	2.7
Ecuador	116,000	1,204,000	168	0	0.2	1.5
Peru	713,859	4,610,000	1,036	0	0.15	4.2
Bolivia	703,604	1,816,000	656	6	0.1	3.6
Brazil	3,219,000	14,334,000	9,368	2	0.3	6.5
Paraguay	97,722	636,000	157	0	0.2	2.5
Uruguay	72,210	959,000	1,210	21	1.7	12.6
Chile	279,901	3,051,000	2,384	3	1.0	9.5
Argentina	1,135,840	4,794,000	10,798	8	1.0	22.5
Total America ...	14,063,061	147,853,000	268,816	10	1.8	18.2
Asia.						
British India	1,766,797	294,361,000	26,950	20	1.5	0.9
Ceylon	25,481	3,741,000	391	32	1.6	1.0
Asia Minor	686,385	19,568,000	2,009	17	0.3	1.0
Russian Central Asia	214,191	7,740,000	1,658	0	0.8	2.1
Siberia & Manchuria	4,832,141	5,773,000	5,664	51	0.1	9.8
Persia	628,000	9,500,000	34	0	0.005	0.04
Dutch East Indies	231,214	29,577,000	1,430	11	0.6	0.5
Japan	147,655	45,862,000	4,366	20	2.9	0.9
Portuguese Possessions	1,428	572,000	51	..	8.6	0.0
Borneo, Celebes, etc.	33,273	719,000	400	92	1.2	5.6
China	1,532,420	407,253,000	1,176	..	0.07	0.03
Korea	84,380	9,670,000	37	..	0.04	0.04
Slam	244,338	9,000,000	426	..	0.17	0.5
French possessions ³ .....	..	..	1,728	..	..	..
Total Asia .....	..	..	46,320	29	..	..
Africa.						
Egypt	383,800	9,833,000	2,953	42	0.8	3.0
Algeria and Tunis	346,396	6,695,000	3,041	15	0.9	4.9
Congo Free State .....	..	..	276	..	..	..
Abyssinia .....	..	..	234	..	..	..
Cape Colony	276,995	2,410,000	3,511	..	1.3	14.5
Natal	36,170	1,040,000	736	..	2.0	7.1
Transvaal	117,732	1,354,000	1,335	..	1.1	9.9
Orange	50,000	385,000	597	..	1.2	15.5
British Africa .....	..	..	1,168	..	..	..
German E. & S.W. Af. ....	..	..	292	..	..	..
French colonies ⁴ .....	..	..	784	..	..	..
Italian Possessions .....	..	..	17	..	..	..
Portuguese Africa .....	..	..	616	..	..	..
Total Africa ...	..	..	15,560	..	..	..
Australia and Oceania.						
Victoria	87,884	1,209,000	2,383	8	3.85	28.0
New South Wales	310,700	1,432,000	3,138	16	1.01	21.9
South Australia	903,690	369,000	1,901	1	0.21	51.5
Queensland	668,497	516,000	2,927	7	0.44	56.7
Tasmania	26,215	179,000	620	29	2.4	34.7
West Australia	975,920	227,000	2,144	58	0.22	94.4
Total Australia ...	2,972,906	3,932,000	14,113	..	0.47	35.9
New Zealand	104,471	833,000	2,403	6	2.5	28.8
Hawaiian Islands	6,449	154,000	88	0	1.4	5.7
Australia & Oceania ..	3,083,826	4,919,000	16,604	13	0.54	33.8
Recapitulation.						
Europe	3,786,030	411,380,000	186,678	8	4.9	4.5
America	14,063,061	147,853,000	268,816	10	1.8	18.2
Asia .....	..	..	46,320	29	..	..
Africa .....	..	..	15,560	..	..	..
Australia & Oceania ..	3,083,826	4,919,000	16,604	13	0.54	33.8
Total .....	..	..	533,978	11	..	..

¹ Including Luxemburg.

² Including Bulgaria.

³ In Asia, Malacca and Philippine Islands.

⁴ Not elsewhere specified.

The Delaware & Hudson Gasolene-Electric Car.

In sparsely settled districts where the cost of operating a steam drawn train is excessive, and the immediate investment of capital for an electric service uncalled for, there has arisen a need for a self-contained car which shall be independent of a feeder system, and at the same time be cheaper to operate than the ordinary locomotive and train. For this purpose, the General Electric Company in conjunction with the American Locomotive Works, at Schenectady, N. Y., has recently completed an experimental gasolene-electric car which presents many features of interest.

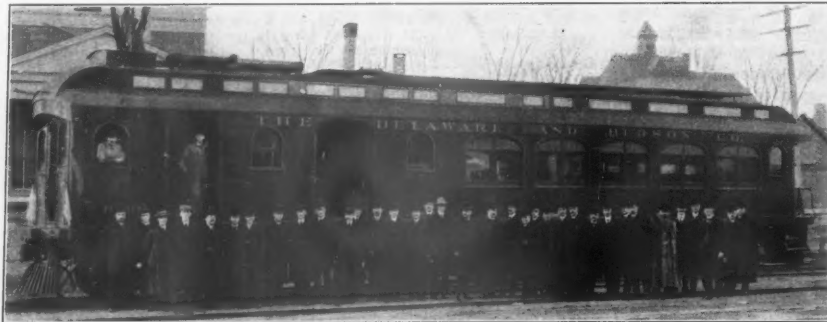
The first trial run of this car took place February 3, when a successful trip was made from Schenectady to Saratoga, N. Y., and return, over the lines of the Delaware & Hudson. During the

engine shaft. When speed is up the jump spark is cut out.

The volatilization of the liquid fuel is produced in two carburetors which form an integral part of the engine. Each carburetor supplies three cylinders and is equipped with two float feed chambers. The chambers are identical and are of the usual needle valve type. Very flexible arrangements are provided to govern the air supply so that it may be taken from the atmosphere or from the crank chamber, or from both according to the conditions required. The mixture is heated to the required temperature in a small chamber which itself is warmed by the exhaust. In temperature in a small chamber which itself is warmed by the all details the engine is very complete. The lubrication is especially so, being force feed for main bearings and pistons and drip feed for all other working parts. Gasolene is stored in steel tanks beneath the car, and the burnt gases pass through the roof into mufflers from which they exhaust into the air. The cooling system for the cylinders consists of radiating tubes located on the top of the car. Water for cooling is contained in the engine base. The heating system for the car forms a shunt with the cylinder cooling system.

The electric current is furnished by a 120-k.w. direct-connected General Electric six-pole unit, designed for 600 volts. This generator is provided with commuting poles, which in connection with the method of voltage control, permits of a very flexible operating system. The advantage of commuting poles is evident when it is considered that the field excitation at starting is weak, and the large current required to give the necessary starting torque. Owing to the peculiar operating conditions of this system, the generator while retaining the characteristics of a shunt wound machine, is separately excited by a $5\frac{1}{2}$ k.w., two-pole compound wound exciter working at 110 volts. This is located on top of the generator and is driven by a Morse silent chain.

There are two motors for the car, each designed to give 200 h.p., and known as the GE 69 type. These are of standard street rail-

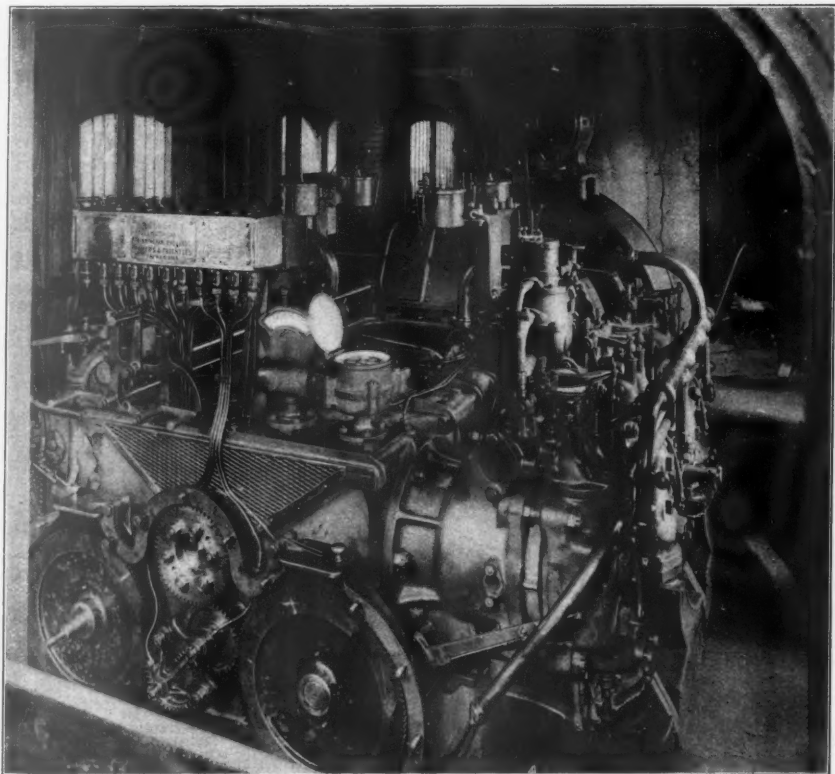


General Electric Co.'s Gasolene-Electric Motor Car for the D. & H.

trip several important features of this method of driving were demonstrated. While the car was not designed for high speed, the average running time was about 35 miles an hour, and several times the car attained a speed of over 40 miles an hour. The smooth and rapid acceleration were most favorably commented upon by the engineers present, as well as the complete absence of vibration which might be thought to accompany the use of a gasolene engine.

This car consists essentially of a gasolene-driven electric generator furnishing current to electric motors geared to the driving wheels and controlled by a method similar to that employed in the ordinary straight electric car equipment. The car in question, shown in the illustration, is of the combination type, comprising a passenger compartment, smoking room, a baggage room, engine room, one toilet and a motorman's compartment; it is 65 ft. long over all and weighs, equipped, 65 tons. A complete controller equipment is located at each end of the car, the forward controller being located in the engine room, while the rear compartment is self-contained. The car has seating capacity for 40 passengers, including seats for 12 in the smoking room. In general it is built on the lines of a standard D. & H. passenger coach, and is handsomely finished. Within, the passenger compartment is decorated in mahogany with a birch wainscoting; the smoking room in quartered oak and both the baggage and engine rooms in painted poplar. The outside of the car is painted and lettered in the standard D. & H. pattern, and Gould pattern bumpers and drawbars are provided.

The gasolene engine for this car was built by the Wolseley Tool & Motor Car Company, Ltd., of Birmingham, Ala., and is considered the most powerful unit yet made for this class of work; it develops 160 b.h.p. when running at 450 r.p.m. The cylinders are horizontal, six in number, 9 in. x 10 in., and arranged in three pairs, the two cranks forming a pair being at an angle of 180 deg. All valves are mechanically operated and the cylinders are water-cooled. Hitherto, difficulty has been experienced in starting internal combustion engines of this size, but in the present case this has been entirely overcome by using shells filled with black powder to provide the initial charge in one cylinder. On starting the engine, the shell is fired by a hand trigger, the whole being similar to the breach mechanism of a gun. Jump sparks and low tension ignition are both provided, current being furnished to the latter by a small dynamo driven from the



Engine Room of D. & H. Gasolene-Electric Motor Car.

way construction and need no special description. For regulating the speed of the motors, as mentioned above, voltage control has been adopted; in other words, the speed of the car is governed by varying the field strength of the generator. With this method the speed of the engine remains constant after acceleration. The controller is semi-automatic, and can be set for any predetermined maximum acceleration. It is arranged for series parallel control, the

motor connections being changed from series to parallel by the reversing handle. This latter has five positions, "series ahead," "parallel ahead," "off," "series reverse," and "parallel reverse." Arrangements are provided to prevent the motor connections from being changed from series to parallel until the resistance is put in the field circuit of the generator.

Further operating details comprise a General Electric combination straight and automatic air-brake equipment, and a special lighting equipment. Meridian lamps are used, equipped with Holophane reflectors, the whole affording a very satisfactory system for car lighting. The headlights are supplied with 100 c.p. incandescent lamps of the stereopticon type, one for each end of the car.

The trial trip of this car demonstrated the practicability of this car equipment, and was entirely satisfactory to the engineers of both companies so far as the tests indicated. The opinion was expressed that this was merely a step toward the final electrification of all service. A gasoline car would be useful in establishing a passenger traffic, but eventually the motive power for operation would be electricity.

The accompanying photograph of the car was taken after the arrival at Saratoga.

The Pennsylvania Station in New York.

At the St. Louis Exposition in 1904 the Pennsylvania Railroad exhibited a large scale plaster model of the terminal passenger station to be built in New York city as a part of the tremendous undertaking of tunneling under the Hudson river, across Manhattan Island and under the East river to Long Island City. A number

The main entrance is from Seventh avenue, opposite 32d street, through a wide arcade which leads into the general waiting room. Small shops will line the two sides of the arcade and also the Seventh avenue front of the building. The arcade ends in a high portico from which a broad flight of stairs leads down to the waiting room floor. The restaurant and lunch room flank the portico on each side, with steps leading up, as they are on a slightly higher level than the floor of the arcade. The passenger entrances from 31st and 33d streets are carried over the carriage driveways below with foot-bridges to the stairways leading down to the ends of the general waiting room. The restaurant and lunch room may be entered from the landings at the top of these stairs. On the Eighth avenue side a separate entrance with ticket offices, waiting rooms, etc., connects with stairways leading directly to the main concourse. The carriage entrances are on Seventh avenue through high portals at the corners of the building. A driveway on a 6.6 per cent. grade leads down from each entrance to the carriage stands opposite the ends of the general waiting room and on the same level. Baggage in wagons is carried around the baggage drive and delivered at the baggage room under the arcade.

The second plan shows the arrangement at the waiting room floor level. The baggage room, cab stands and driveways occupy all the space in the eastern half of the building. In the center and extending almost the entire width of the building is the general waiting room, 114 ft. x 276 ft. The women's waiting room and toilet, 57 ft. x 97 ft., and the men's room of the same size flank the wide entrance to the main concourse. Ticket offices, telephone, telegraph and news stands are arranged along the walls. The baggage counter is under the stairway leading down from the arcade with entrances from the waiting room on each side of the stairs. The



Seventh Avenue Elevation of the New Pennsylvania Station in New York.

of photographs of this model were reproduced in our issue of Sept. 3, 1904, but at that time we were unable to show any drawings giving a clear idea of the size and arrangement of the building, which will be the largest of its kind anywhere in the world. In this issue we show three plans at different levels and a number of cross-section profiles. A photograph of the model is also shown again to give a better idea of the proportions and appearance of the building. For a general description of the tunnels under the city and the rivers on each side the reader is referred to our issues of October 9 and 16, 1903.

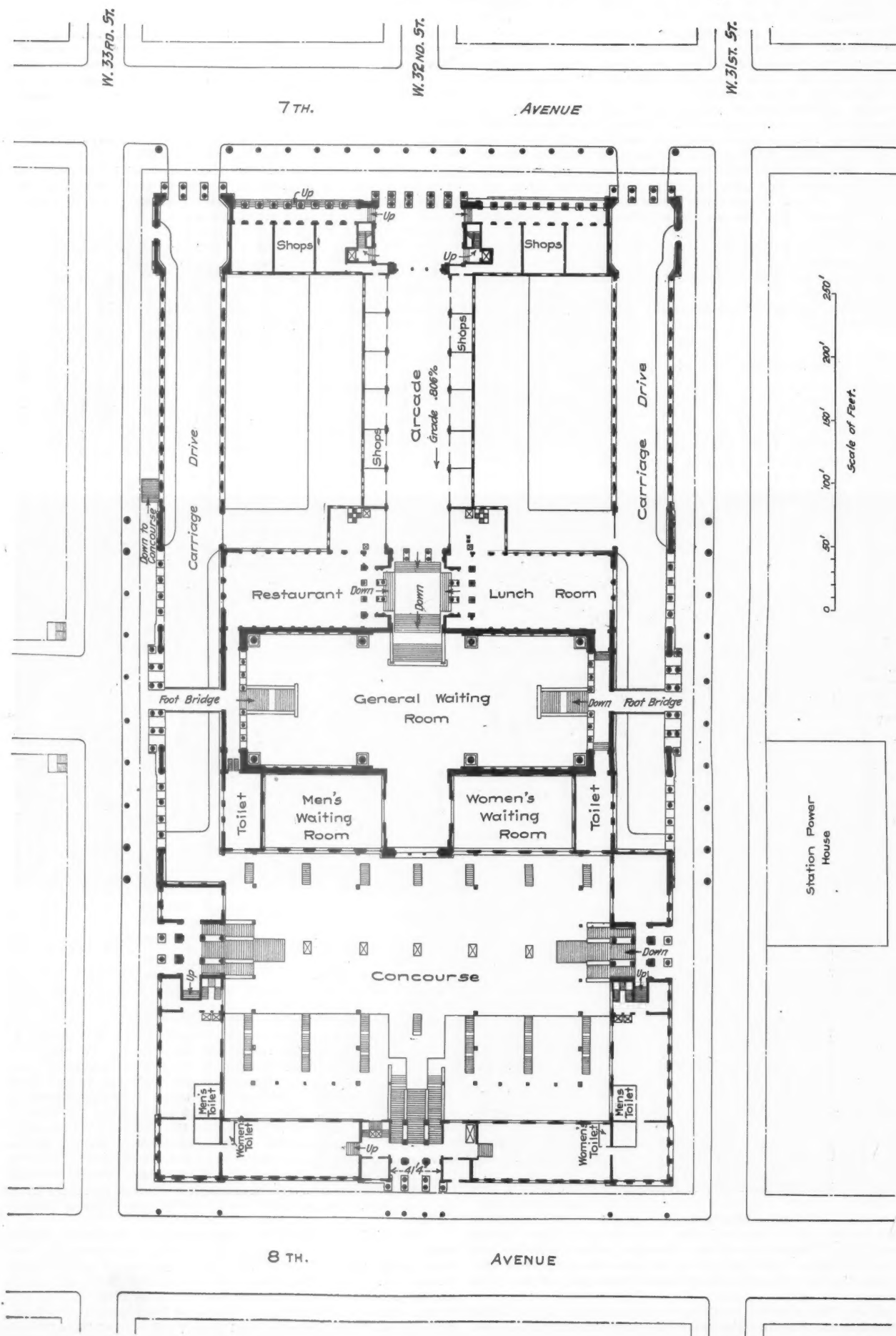
The station will occupy the entire area of four city blocks bounded by Seventh and Eighth avenues, and 31st and 33d streets. Work on the excavation, which will be carried down about 40 ft. below the street level, has been in progress for nearly two years and is not yet completed. The dimensions inside the main foundations are 800 ft. by 512 ft. The building will be of white granite and the architectural treatment is essentially classic, with a long colonnade of massive columns extending the full length of the Seventh avenue side. The entrances on 31st street, 33d street and Eighth avenue will be flanked with large columns supporting the ornamented porticos at the eaves. The main body of the building will be only 65 ft. high above the street, but the arched roof over the main waiting room, extending across the building, will be 155 ft. high.

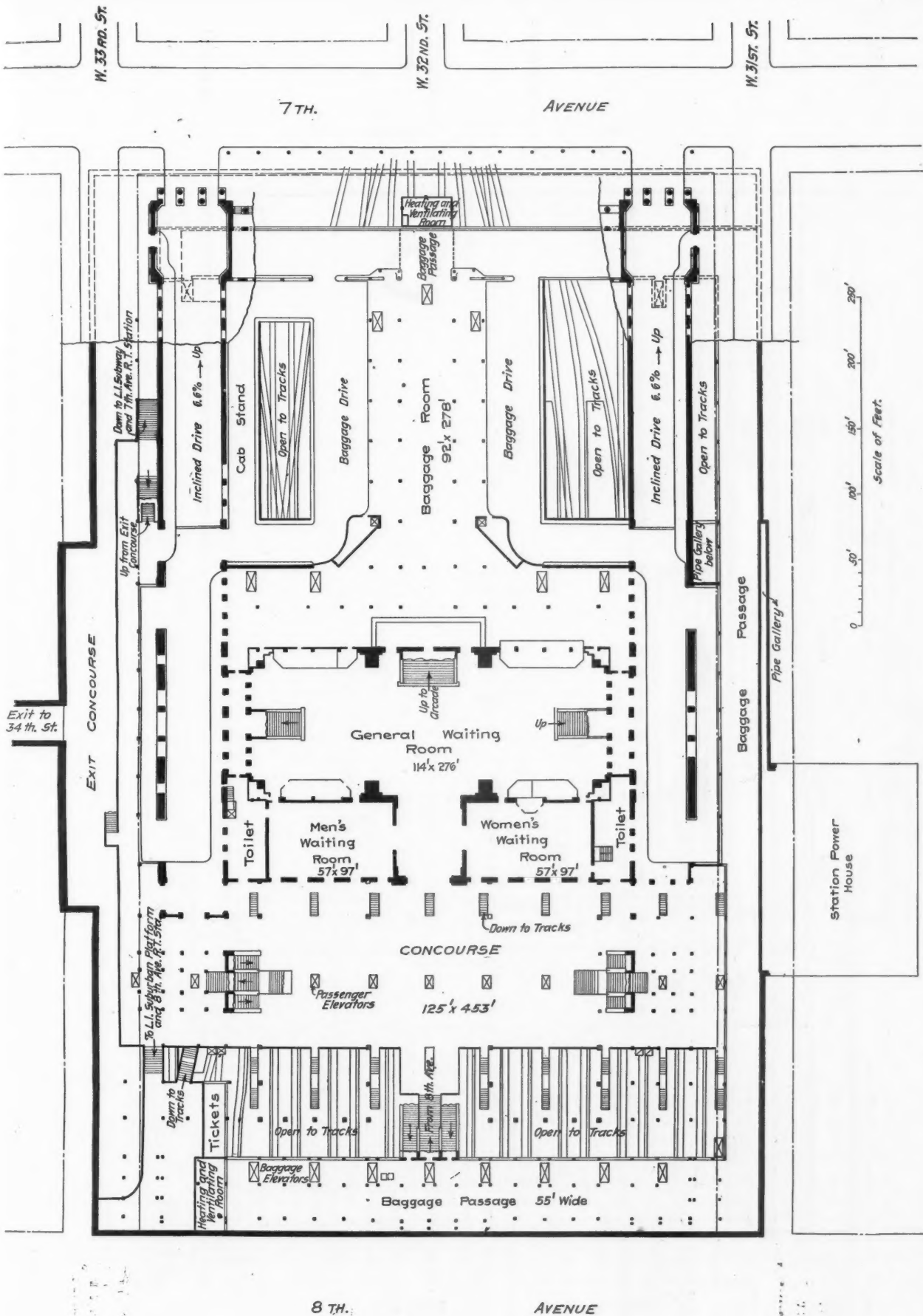
All the waiting rooms, baggage rooms, concourse, etc., are below the street level. The first plan shows the arrangement at the street level with the entrances and exits on all four sides of the building.

waiting room has a high vaulted roof supported by massive ornamented columns.

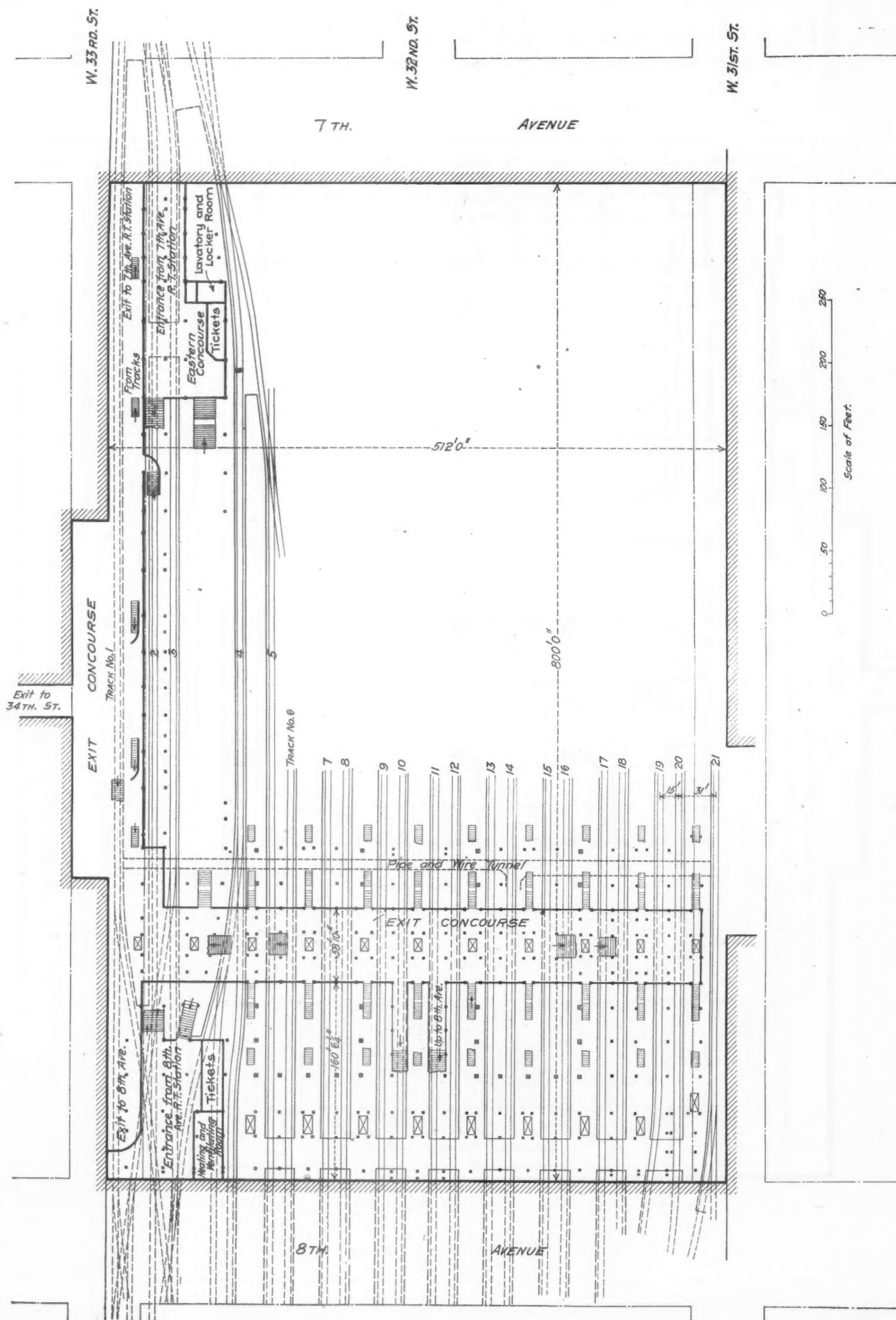
The main concourse opening off of the waiting room is 125 ft. wide and 453 ft. long, spanning all the tracks on the level below. It will have a vaulted roof with a clear span of 125 ft., which will form part of the roof of the main station building. Broad stairs at each end lead up to entrances and exits on 31st and 33d streets and opposite the entrance to the waiting room are the stairways leading to Eighth avenue. From both sides of the concourse, stairs lead down to each of the train platforms below and in the center nine large passenger elevators will carry passengers down to and up from trains. The space to the west of the concourse is open from the tracks up to the roof of the building. On the same level as the concourse, on the Eighth avenue side, a baggage passage 55 ft. wide extends across the entire width of the station over all the train platforms. Baggage will be raised and lowered on eight baggage elevators and trucked through a passage extending along the 31st street side up to the end of the baggage room at Seventh avenue.

The third plan shows the arrangement at the exit concourse level and the number and location of tracks and platforms. The exit concourse is 58 ft. 10 in. wide and crosses above all the tracks. At the north end it branches, one exit leading to Eighth avenue and the other to Seventh avenue with a tunnel to an exit on 34th street. Connection will be made at this level with the proposed Seventh and Eighth avenue rapid transit subways which will cross the railroad company's tracks on the upper level. Suitable ticket

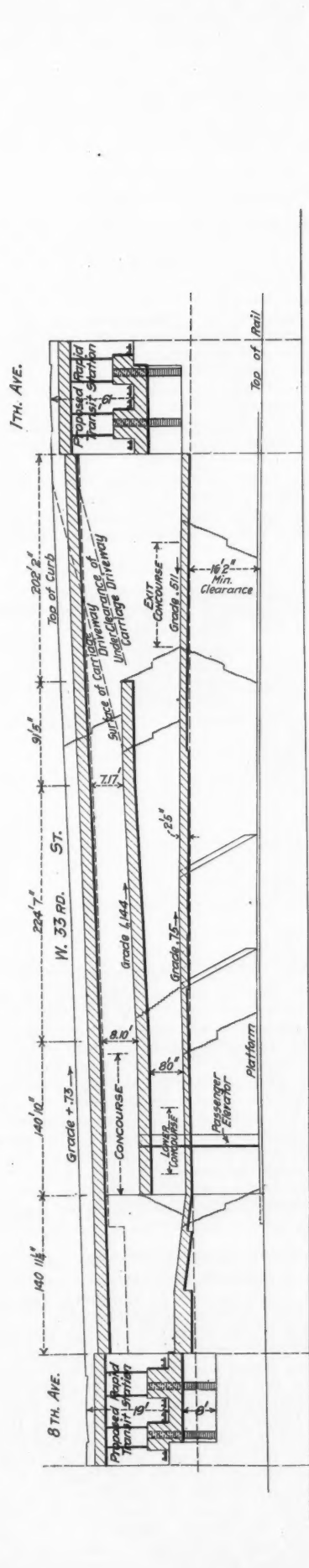




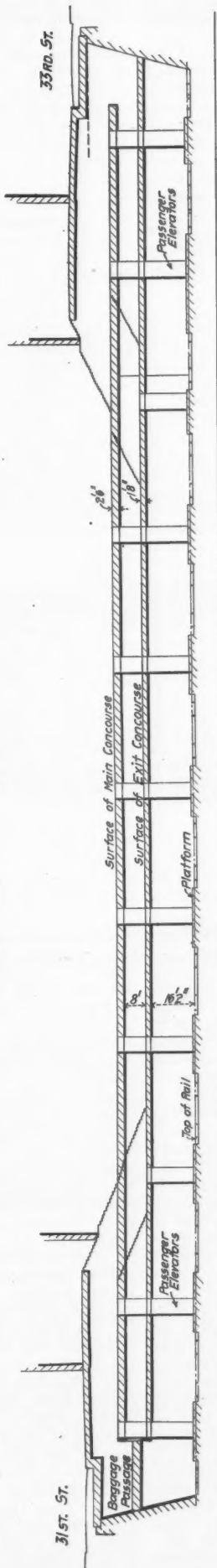
Plan at Main Concourse and Waiting Room Level—Pennsylvania Station in New York City.



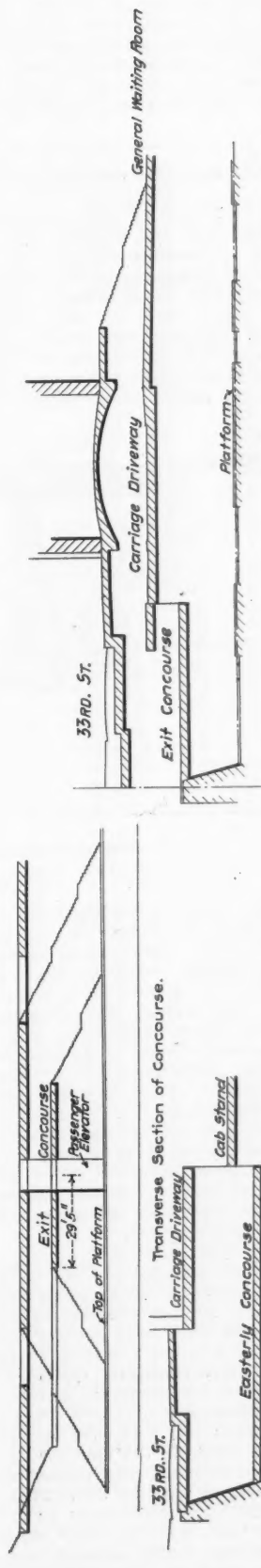
Plan at Exit Concourse Level, Showing Tracks and Platforms—Pennsylvania Station in New York City.



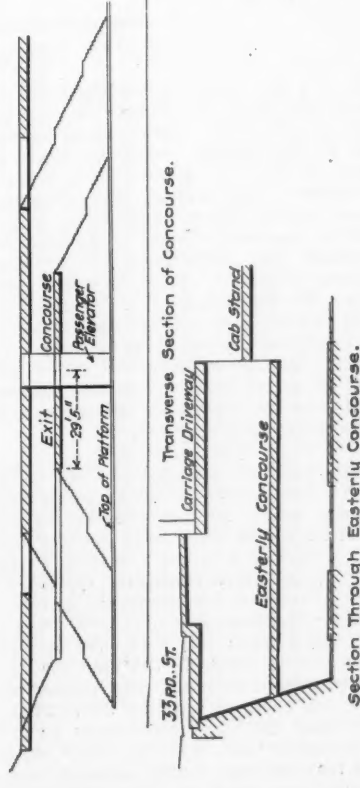
Profile Under 33rd Street.



Section Through Concourse Looking West.



Section Through Waiting Room Looking East.



Section Through Easterly Concourse.

Sectional Profiles Through Pennsylvania Station in New York City.

offices will be provided at the entrances from the subways, and stairs will lead up to the main concourse.

The tracks in the station will be 21 in number with 11 platforms. They will be spaced 31 ft. centers over platforms and 15 ft. centers between platforms. The platforms will be clear and unobstructed by columns, and all baggage and mail will be handled at one end, away from the passengers. West of Eighth avenue the tracks begin to converge into the four-track tunnel under 32d street which leads to the two single track tubes under the Hudson river. At the east end the tracks begin to converge under the station to enter the two double-track tunnels under 32d and 33d streets which meet the four single-track tubes passing under the East river.

The heating, lighting and ventilating plant for the station will be in a separate power house across 31st street. Pipe galleries will extend under the street and distribute the wires and piping throughout the building.

Medal for Heroism.

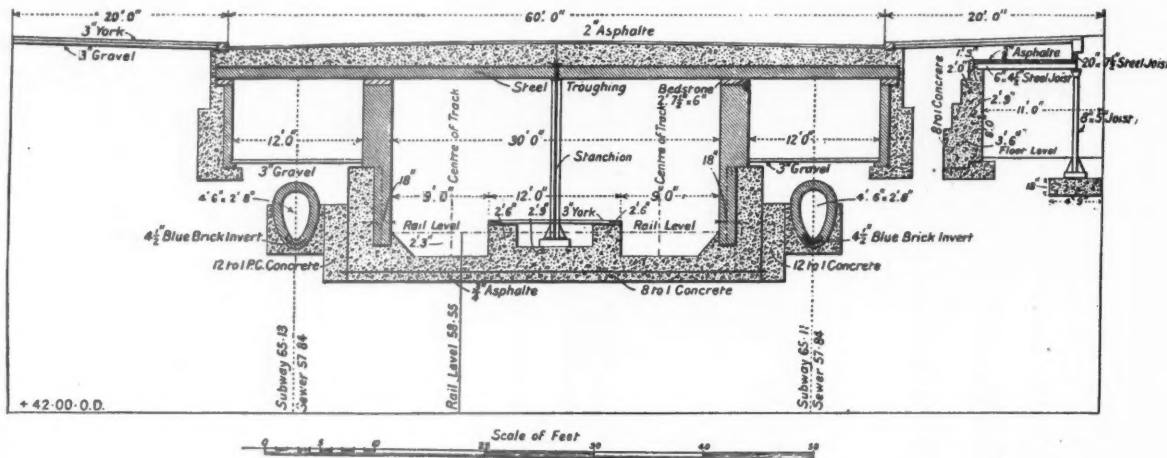
The first medal to be granted to a railroad man for heroism, under the Act of Congress of Feb. 23, 1905, has been sent by President Roosevelt, with a commendatory letter, to Mr. George Poell, of Grand Island, Neb., a fireman on the St. Joseph & Grand Island, who, on June 26 last, near Powell's Station, Neb., saved the life of a child two and a half years old, son of Station Agent John Ussary at that place. The child was standing or walking on the track when Poell's train (freight train No. 16) approached at about 30 miles an hour on a descending grade. Poell noticed the emergency application of the brake, looked up and out of the window

railroads provided has not nearly sufficed. The prospect that business may be stifled for some months to come alone could induce the government to consent to have rolling stock built outside of the country. The railroad department, which provides for a large part of the government's expenses out of its surplus, which this year is larger than ever before, is always ready to provide for every possible want; but the Finance Minister is so dependent upon the railroad surplus that he must insist on limiting railroad expenditures.

The London Tramway Subway.

The *Tramway and Railway World*, London, for January 11, contains a description of the first electric tramway subway to be built in London which is soon to be opened for operation. It has been built and is to be operated as a municipal project by the London County Council, which already operates a number of surface tramway lines south of the Thames. This is also the first municipal project undertaken north of the Thames. The line extends from the Strand to Islington and beginning in a subway under Aldwych and proceeding under Kingsway, the cars will emerge at the junction of Southampton row and Theobald's road. The route follows the latter street to Rosebury avenue, along which it continues to Islington. A new and direct route will thus be opened between the Thames and the north of London and a very dense traffic will be dealt with.

The subway, which is the first undertaking of the kind in England, has a marked similarity to the subway constructed in Boston, Mass., in 1900. The London subway was first suggested in 1898, with the proposal for the construction of the new street. The estimate of



Section Through Queen Street Station.

and saw that it would probably be impossible to stop the train before reaching the child. He quickly ran out upon the running-board and to the pilot of the engine, where he succeeded in grasping the child by the clothing, while the train was still running about 12 miles an hour, and threw him into the ditch, saving his life. Poell, however, was severely injured—being unable, in his haste, to secure a good footing on the 4-in. step at the bottom of the pilot—and he was nearly killed, losing his left foot and having both arms broken. The committee which awarded the medal consisted of Secretary Moseley, of the Interstate Commerce Commission, and Messrs. W. P. Borland, J. W. Watson, W. R. Wright and G. E. Starbird. All of these men are connected with the Interstate Commerce Commission, the last three as inspectors of safety appliances. Poell is a member of Lodge No. 277 of the Brotherhood of Locomotive Firemen. He has recovered, and has been elected County Clerk. The *Locomotive Firemen's Magazine* prints a picture of Poell, with the child whom he saved.

A war scare has been manufactured out of the letting of contracts for 20,000 freight cars for the Prussian State Railroads. As for some months nearly all industries in the country have been complaining bitterly that they could not get nearly cars enough to ship their products, it is not necessary to imagine any military purposes behind these contracts; especially as the existing car stock would hold all the armies of Europe, and in case of war the ordinary industries would have much less need of it. Germany has had a boom this year, like another country which we need not mention. Early in the year the railroad authorities get together representatives of the chief industries—coal, iron, beet-root, etc.—and ask them to estimate their traffic for the ensuing season, that it may be more intelligently be provided for. Last spring their estimates were that they would do about 4 per cent. more business than the year before; actually, they have done about 8 per cent. more, and the 6 per cent. increase in cars which the

cost of the construction of such a subway, and of the tramway for a system of electric traction was £282,000 (\$1,368,000).

The Council decided that it was desirable, notwithstanding the large capital required, that the experiment should be tried. A bill was accordingly introduced into Parliament to confer upon the Council powers to construct the subway and a tramway within it and extending along the Thames Embankment to and across Westminster bridge. The proposed tramway along the embankment encountered much opposition, and that part of the scheme was rejected. The Council was, however, authorized by the London County Council (Subways and Tramways) Act 1902, to construct a subway from Southampton row, along Kingsway and Aldwych, to the Victoria embankment. They were also given power to construct tramways in the subway, but only as far as the north side of the Strand.

The construction of the subway was carried out at the same time as the formation of the roads. Stations have been constructed at the northern and southern ends of Kingsway, the entrances and exits being placed in the center of the roadway.

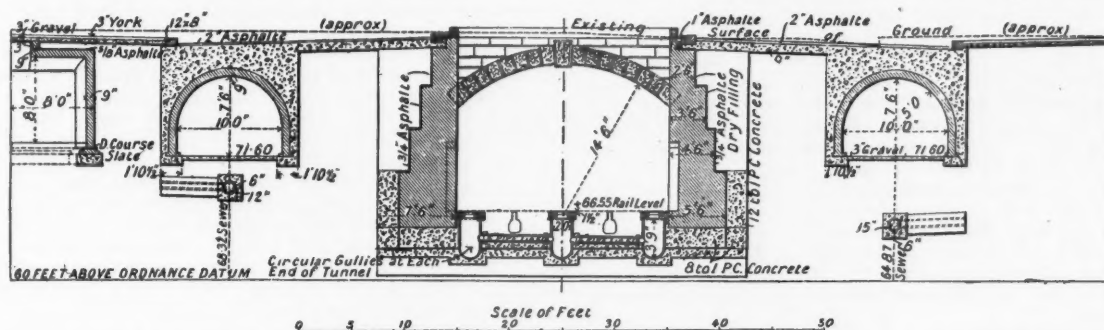
The greater portion of the subway is close to the surface of the street, but in the short length of less than a mile between Theobald's road and the Strand there are several kinds of construction. The rails are on the surface in Theobald's road, then they descend below the surface in Southampton row by an open cutting in the center of the street for 170 ft. The two lines then form a double S curve of 500 ft. radius vertically, and dip under Holborn in two deep level cast-iron tubes, which were driven under the street by Greathead shields, and then rise close to the surface at the station in Kingsway, a little to the north of Great Queen street. From this point to the station situated at the junction of Kingsway and Aldwych, the subway continues close to the surface; in fact, the depth from the surface of the street to the top of the subway is only about 3 ft. After turning under the western arm of Aldwych, the subway falls very quickly again, in order

that it may pass under the Strand in cast-iron tubes at a deep level. At present the subway has been carried only as far as the curb at the north side of the Strand. After passing under the Strand it will be continued along Wellington street, and will finally emerge on the embankment at road level. The varying levels at which the subway is built show the difference in construction necessary when going along a new street specially constructed, in comparison with crossing existing thoroughfares. It was necessary to dip the rails to a depth of 31 ft. below the surface of the roadway in Holborn, to avoid existing sewers and other obstructions. At the Strand crossing the rails had to be kept 34 ft. below the surface for similar reasons. Under Kingsway no obstructions had to be dealt with, as the sewers are in duplicate one on each side of the street, and the pipe subways also on both sides, take all gas and water pipes, electric cables, etc.

No inconvenience, however, is caused to the public by the dip

4 to 1 cement. The rails are jointed with fishplates of the ordinary type, a sole plate (2 ft. by 1 in. by $\frac{3}{4}$ in.) being placed underneath. This plate is secured to the rail with $\frac{3}{4}$ -in. countersunk bolts. As it was not necessary to make provision for vehicular traffic, the form of construction adopted for the conduit presents considerable variation from the type used for ordinary street tramways. Supporting channels, embedded in the concrete, and further secured by bolts, are placed at intervals to carry the slot rails, which are of a special design. They are made in lengths of about 7 ft. 6 in., and can easily be lifted to enable inspection of the conduit to be made. Energy for working the cars will, until the tramway power-station at Greenwich is completed, be purchased from the Metropolitan Electric Supply Company.

For the service through the subway a new type of car has been constructed by the United Electric Car Company, Limited, of Preston. It is a practically all-steel car, and is of the single-deck



Section at Northern Entrance of Tunnel under Holborn, Showing Retaining Walls of Open Approach.

under Holborn and the Strand, as the stations are fixed at points where the subway is close to the surface. At both Great Queen street and the junction of Kingsway and Aldwych, the platform is only 16 ft. below the street level, so that it is not necessary to provide lifts. The tramcars will run at short intervals, and as passengers will be continually entering and leaving by the short flight of stairs, it is hoped that the platforms will not be unduly crowded. It will never be necessary to break up the surface of Kingsway for the purpose of laying pipes, as ample room is provided in the pipe subways at both sides, and, in fact, the small depth from the surface of the road to the top of the subway will not permit of any pipes being laid in the roadway. At a considerable depth below the tramway subway, the Great Northern & Piccadilly Railway is being built, and it will have a station in Kingsway, a little south of Holborn. This is an ordinary tube railway, which will eventually be carried under the Thames to

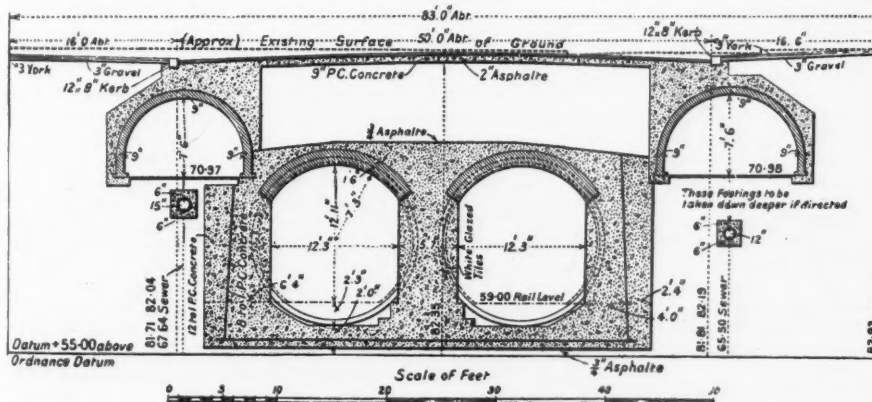
bogie type. The underframe is built entirely of steel angle and channel sections. The side and end framing is formed of a combination of angle and H sections, which are secured to the sills with rolled-steel angles cut to suit and riveted to the posts and sills. Cant rails and garnish rails run the whole length of the car in one piece, and are riveted to the posts, the joints being strengthened by gusset plates well riveted. The fender rails also run the whole length of the car, but are so divided as to admit of the panels, which are of sheet steel, being removed in sections. The main panels below the window belts, and the fender rails, have curved surfaces in accordance with the usual practice, and the cars have five fixed windows on each side. The roof frames are composed of Z and L steel sections covered with steel panels.

The inside finish of the cars is composed entirely of aluminum, the ceiling being formed by aluminum sheets, on which suitable decorative designs are chased and picked out in dark colors. Above the ventilator lights and the doors will be aluminum mouldings, so designed as to render cleaning as simple as possible.

The ventilating sash in the roof is glazed with decorated glass, the ventilator sashes with $\frac{3}{16}$ -in. plate, and the side windows with $\frac{1}{4}$ -in. plate, all the glass being set in with non-inflammable felt. The side windows are furnished with adjustable spring roller blinds, furnished with non-inflammable Pantasote.

The compartment doors are of the twin type, made of steel plates, the upper part being glazed with $\frac{3}{16}$ -in. plate glass, set in non-inflammable felt, the lower panel being of aluminum, and the top of the door being furnished with "hit and miss" ventilators. These doors have a twin operating device to enable them to work simultaneously. The platform doors are so arranged as to work with a folding step, which prevents entrance to the car from the front end when in operation. The signal lamps are of the oil type, so arranged as to illuminate the inside of the car in case of failure of the electric lamps.

The seats are of the longitudinal type, and are formed of oak slats screwed to angle steel supports, the slats being rendered non-inflammable. The car bodies are mounted on center-bearing maximum traction trucks provided with steel-tired wheels. A special requirement in the construction of these cars is interchangeability of the various parts from one car to another, and this has been given special prominence in the design and execution of the work. Whether this will be found an advantage in maintenance remains to be seen. All the metal fittings are of brass, copper oxidized finish. The floors will be covered with steel plates and over this with "litosillo." The exterior painting is in the L. C. C. standard colors.



Section at Entrance to Iron Tubes under Holborn.

Waterloo Station. There are, therefore, lines of traffic at three different levels in the new street—the ordinary traffic on the surface, the tramway traffic a short distance below the roadway, and a tube railway at a still deeper level.

The conduit system was selected for the new line, and it is continued in the subway. In ordinary conduit work the first operation is, of course, excavation of the roadway. In the subway, on the contrary, it was necessary to build up the conduit and track from the bottom of the tunnel. For this purpose concrete has been used. The rails rest on longitudinal wood sleepers, 12 in. wide by 6 in. deep, to which they are bolted by $\frac{3}{4}$ -in. bolts. Sleeper anchors are secured by $\frac{7}{8}$ -in. by 15-in. bolts.

The longitudinal wooden sleepers are embedded in 8 to 1 concrete, which reaches to the underside of the head of the rail. Above the concrete is 4 in. of ballast, which is finished off with

The Division Engineer.

I.

We are speaking only of such experiences as occur to a Division Engineer in railroad work. The purpose is to mention the things common to all of us who have this particular point of view. My own experiences are colored by the conditions surrounding the companies for which my lot has been to be a Division Engineer. And, for the present, at least, we shall speak of maintenance work only.

When a railroad man is first promoted to Division Engineer, his most common mistake is to try to continue in the duties of the position which he has just held. If he was promoted from Assistant Engineer, or from Superintendent of Bridges and Buildings, or from Roadmaster, he will try to continue those duties. He has not learned to let go, and to depend on others' help. Some few of us try to keep up this detail work all our lives. General Grant found it difficult to get some men to be really brigadier generals. They would forget, and persist in leading one of their regiments instead of commanding the whole brigade. If we are promoted to the office of Division Engineer late in life, we often fail to learn the lesson of letting go the details. A somewhat different trouble, but a similar result, is seen when a young engineer with little knowledge of details of track or bridge work is made Division Engineer through family influence or some one's mistake. This young man burns with an ambition to let everyone see he knows track and bridge work, and shows off that scrap knowledge he has picked up. He will criticize a switch, find good ties among those taken out, and condemn bridge bracing, just to convey the idea to novices present that he is a very smart Division Engineer—in his own estimation.

When first put in charge of a division as engineer on maintenance, recognize at once that there are other practical men there and that you are supposed to be rather the scientific one in your line of work. Leave the practical track work to the Roadmaster and his foremen. If you do not know how to put in a switch, do not pretend to know it; and, whether you know it or not, never try to put one in save in emergency and when no one else is there to do the work better. As Division Engineer, yours is the organizing and business side. If you know the practical side of track and bridge work, drop it now at once. There are others to do it, and you should not take the time from your other and present duties. In a word, if you have been a Superintendent of Bridges and Buildings or a Roadmaster, quit it. If you have never been a Superintendent of Bridges and Buildings or a Roadmaster, don't try. You are Division Engineer, and the duties of that one position are what the railroad company expect of you. To think that you must now know how to do any of the work of each man under you is a fallacious notion of 15 years past. The idea is not now admissible in a man under 65 years of age.

In your treatment of Roadmasters and Superintendents of Bridges and Buildings use a judicious mixture of military discipline and the golden rule. Laxness is not kindness to an employee. Good men expect to do their duty. Bad men soon despise you if you do not make them do their duty. Good men never leave you because you make them do their work properly and promptly. Laxness is a weakness on your part, and a shrinking by you from an unpleasant duty. A kind man once had a first-class waitress. After some time she said she must quit. When asked the reason, she said that she was fast becoming careless and would soon be a poor waitress. So she was going back to her former master, who would swear at her once in a while. While profanity is no part of discipline, there is a germ of sound philosophy in the incident. It is easier for you to let things drift, and your ease is sweeter to you than your duty. The best of men sometimes forget and need just enough admonition of the right sort given in the right manner. Men so handled become better disciplined the longer you have charge of them.

Give clear orders. To understand orders as usually given is often not easy. Be definite, and positive, and brief. Give an order in the language the man who receives it speaks. Never mind about diction. Talk straight or write straight just in the lingo of the employee, if you can possibly do so. Point it out, if you can, instead of talking it. We were ballasting, surfacing and lining a difficult piece of track at one time. The engineer party had set stakes. Dropping off there to look it over, I saw that things were not going well. There was confusion between super elevation and run-off. I spent a couple of hours there with Brennan (all roads have a Brennan on track) and won his gratitude. Between us we got praise from the Superintendent for better riding track and faster progress in ballasting. When I left the division old Brennan declared in his patois that I was "the besht d— mon that iver shtruck the Mountain" (division). A high compliment. If you must write, use the fewest and shortest words you can. Be positive in orders. Say do and do not. Answer yes and no to queries. Do not dodge. Do not leave an anchor to leeward through obscure or vague orders. If you do not know what you want done, or if you fear the responsi-

bility, then resign. Vague, wordy, slipshod or equivocal orders made for a cloak on future days of reckoning are unprofessional. A railroad man must be brave.

Should instructions or orders be verbal or written? It is a much-discussed question. Passing over the general case, it is my experience in quite a good many years as Division Engineer and on three different roads, differing in organization, that as a general practice no instructions or general orders should be given in writing by a Division Engineer to Roadmasters and Superintendents of Bridges and Buildings. My reason is that it is not their way. In their earlier work as foremen they were used to receiving their orders verbally. They are little used to letters in their life work. You are using a foreign tongue, or at least new methods. Why not adapt yourself to them? There is but one of you and probably six of them. Is not such a course best for the company's interest? When in an emergency you issue written instructions of some length you must in nine cases out of ten go and explain them verbally. Some may say they want to place themselves on record. Well, if your spoken word is not good, your written one would not stand in court very long, for there could be found people who know you. If a man's word is not good, what is his letter or his bond worth? Letters you must use to a certain extent, but never depend on them. Supervision of track, bridges and buildings on the part of a Division Engineer by letter is practically worthless. There must be some progress reports sent in to you so you can report progress to your superiors as demanded, but these reports are pretty ancient history for a Division Engineer. You should see the work so often and so well that your knowledge of its progress is broader, deeper and better than any report can give. If you give your work office supervision in the main, you make a vital mistake. Soon a wily Roadmaster somewhere is doing ill and as he pleases, and giving you fairy tales by mail. Soon you will think a good man a poor one, when if you had been out on your work much you would have been sure to see his good qualities. If you criticize work by letter without seeing the work, what force has the criticism? Soon no one cares what you think. A Division Engineer is the one engineer who comes naturally in most direct contact with the men of all kinds and grades. Personality counts much here. The touch of the elbow and the grip of the hand are most potent here. Do not sell your birthright for a mess of pottage.

RAILROADER.

Mr. Wallace Before the Senate Committee.

Mr. John F. Wallace, whose resignation as Chief Engineer of the Panama Canal is fresh in the minds of the readers of the *Railroad Gazette*, was this week called before the Senate Committee on Inter-oceanic Canals, and has given a long explanation of his relations with the Secretary of War and the other officers with whom he had to deal while he was connected with the canal.

Mr. Wallace was before the committee on Monday and Tuesday, and the first part of his testimony dealt with his relations to William Nelson Cromwell, of New York. Mr. Cromwell's only official relation to the canal is as director and counsel of the Panama Railroad.

Mr. Wallace's chief reason for resigning his position was that he "was made jointly responsible with Mr. Shonts and Mr. Magoon for work on the canal, while Mr. Shonts had a verbal agreement with the President that he should have a free hand in the management of all matters. I felt Mr. Shonts was not as well qualified as I was either as a business man or an administrator; and he was not an engineer. I thought I was to be director general of the canal work. I thought it better to sacrifice my ambitions regarding this work, which was to be the crowning event of my life, than remain to be humiliated, forced to disobey orders, or create friction."

After outlining his objections to Mr. Cromwell, Mr. Wallace said, in reply to an inquiry: "I thought about him as being the man who brought about the sale of the canal to the government; who brought about the revolution in Panama; who assisted the government of Panama in making its investments; who is carried on the diplomatic list of that government, and who is interested in public utilities on the isthmus. I felt that a man mixed up in so many things might have his mind perverted, and at some time he might give the wrong advice, and the result would be a scandal. All the interests in Panama look upon Cromwell as their friend. He is the principal stockholder in the Panama-American Company, which handles ice and electricity."

Mr. Wallace had found that the Panama Railroad paid dividends in excess of earnings and then had sold bonds to repair ships and cars; and this made him suspicious of Mr. Cromwell. As to resigning without notice, Mr. Wallace said that he was liable to be dismissed at any moment by telegraph; and he took care that the work in his charge should not suffer by his resignation. When he came to New York to resign he found that he could not see Secretary Taft except in the presence of Mr. Cromwell; and therefore he then gave only a part of his reason for resigning—an offer of larger compensation which he had received. Mr. Cromwell appeared to be the principal adviser of the Secretary of War in all canal matters. He

procured the appointment of Mr. Wallace as President of the Panama Railroad.

On Tuesday Mr. Wallace described the conditions on the Isthmus and the difficulties of his work. He had a definite programme, and intended to make an annual report explaining his whole plan and course, but the report was never made. With the French excavating machines, which had cost \$30,000,000, Mr. Wallace experimented sufficiently to discover that the machines were not fit for use. The experiments made in March, showing that excavating could be done at 43 cents a yard, were not sufficient to show with certainty the cost of doing the same kind of work in the rainy season. Mr. Wallace's successor had not had the benefit of his analysis of the year's work because, said Mr. Wallace in reply to a question, "the Secretary of War told me he did not want a report; he had no use for me except on the Isthmus as a directing engineer." Secretary Taft was very angry at the time of this conversation.

Mr. Wallace said that in all his experience in railroad construction he had never seen men better fed and housed than they were on the isthmus. The complaints, he said, came from clerks who went to the isthmus from Washington or New York, who had the

shown clearly that the Civil Service system was not adapted to procuring expert labor for work on the isthmus.

Speaking of the Bohio dam, Mr. Wallace said he discovered that solid rock bottom could not be found nearer than 167 feet, instead of 128 feet, as had been shown by the Walker borings.

He did not favor the eight-hour day and recommended that as few restrictions as possible should be placed on Mr. Stevens and that the "wolves should be kept off his back." If the canal work should be let by contract, said Mr. Wallace, the eight-hour provision would increase the contract price about 20 per cent. He thought the man in charge should be permitted to get his men in China, Japan, India, Spain or where he pleased.

The Application of Card Index Systems to a Motive Power Office.*

With the rapid growth of railroads, the attention of their officers is being turned to simplifying methods of performing work as well as simplifying records, and thereby reducing the amount of clerical work to a minimum. Industrial corporations and manufacturers have long since recognized the usefulness, simplicity and

practicability of the index system and card indices are rapidly becoming more popular in railroad offices.

In most railroad offices space is scarce and at a premium, while the most serious objections to general office book records are that they are unwieldy, cumbersome, and they lack the possibilities for alterations and expansion which card systems offer. Particularly in the cases of locomotive, car, machine tool and pattern records, we find book records inconvenient for comparisons over any period of time. Instead of cards, loose leaf systems of filing are frequently preferred, but personally the writer is partial to cards because they are more substantial, less liable to become lost or torn and may be more easily corrected without marring the paper.

Our draftsmen and clerks have evinced great interest in changing from the book records to the card forms, and have in several cases devised card forms which have been adopted. In this connection attention is directed to a card which obviated the use of three book records devised by our account clerk. (Card No. 1.) These cards are $2\frac{7}{8} \times 11\frac{1}{2}$ in. and what is known as "tenth cut"; that is, on ten consecutive cards the number tabs have traversed the width of the drawer. The cards just fit the desk drawer, making it handy for entry or reference without necessitating the accountant leaving his seat. Three general heads will be noted, viz.: "Transfers," "Repairs" and "Mileage."

Under "Transfers" we report to which the engine shop at which the repairs were made, together with the mileage made each month on which reported it.

Card No. 2 is a historical and current record of locomotives. On the face we find the historical record and description and on

*Presented at the January meeting of the Western Railway Club by J. H. Wynne, Mechanical Engineer, of the Illinois Central.

TRANSFERS				REPAIR				Locomotive Mileage															
DATE	FROM	TO	SHOP	CLASS	DATE IN	DATE OUT	COST	MONTH	Des Moines	Des Moines	S. St. Louis	Millerton	Clinton	Freepert	Waterloo	Wm. Valley	McComb	Hempstead	Paducah	Wabasha	WINT.		
Jan	3	1	Genl	Bridge	2-23	3-29-5	99.9	1905													1905		
Feb	1	1	Bridge	Wp. L	1-6	1-30	88.1	Feb.								11.2		16.3			Jan		
Feb	3	3	Bridge	2	9-6	9-18	126.00	Feb.								11.0		5.9			Feb.		
								March	36.7												March		
								April		10.7											April		
								May										47.4			May		
								June										50.2			June		
								July										46.6			July		
								Aug.										40.5			Aug.		
								Sept										67.6			Sept.		
								Oct										21.6			Oct.		
								Nov.										11.5			Nov.		
								Dec.										20.1			Dec.		

Card No. 1.

HISTORICAL AND CURRENT RECORD OF LOCOMOTIVES ILLINOIS CENTRAL RAILROAD CO. RECORD OF ENGINE NO.

GENERAL DESCRIPTION		OLD		PLACE & DATE		DETAIL DESCRIPTION	
		NUMBER	INITIAL	CHANGED			
BUILDER					Boiler	Boiler type	
BUILDER NUMBER					Cylindrical diam.	Working pressure	the material
DATE BUILT					Platen packing	Diam. of flange O. D.	domo I. O.
CLASS	TYPE				" rod diam.	Thickness of sheets barrel	throat
SERVICE					" " packing	" " " roof	slips back
MILEAGE (between general repairs)					Valve stile	Roams circumferential	
TRACTIVE POWER (in pounds)					" " travel	" horizontal	
HAULING CAPACITY (level track)					" " lead in full gear	Fireplug length	width
CONVERTED					" " steam packing	" " dash front	back
SCRAPPED					Eccentric throw	" " shaft sides	back crown tube
SOLD					Link saddle pin offset	Water space front	slides back
REMARKS					Driving wheel tire thickness	Crown sides	crown bars
					" " center diam.	Slabells	material Ho. flange
					" " box material	Flange material	length
					" " axle	" " Ho.	Crown Gauge
					Crank pin material	Healing surface tubes	sq. ft.
					" " main	" " " " " " " "	
					Engine truck stile	" " " " " " " "	
					" " wheels	Grate stile	area
					" " journals	" " length	width
					Trailing truck stile	Exhaust pipe stile	nozzle
					" " wheel tire thick	Smoke stack diam. I. O.	style
					" " center diam.	" " " " " " " "	
					" " axle journal	" " " " " " " "	
					Tender frame material	Air signal	sender
					" " draft gear	" " dome	Safety valve
					Tank stile	" " brake engine	Smoke casing
					" " capacity coal	" " tender	Steam heat
					Tender truck stile	Bell ringer	
					" " wheel	Blow-off cock	Whistle
					" " journal	Brick arch	Pilot coupler
					" " normal box	Combustion tubes	Tender "
					" " axle beam	Lubricator	
						Injectors	
						Additional special appliances	

Card No. 2.

[illegible]

Reverse of Card No. 2.

Idea from musical comedies that to live in a tropical climate was to lie in hammocks and enjoy themselves. Efforts to establish a Young Men's Christian Association on the isthmus for the benefit of the canal employees were stopped because Governor Magoon had said that Secretary Taft did not wish the work to go on. Mr. Wallace thought this was because the community was Catholic.

Discussing labor conditions, Mr. Wallace said many Civil Service appointees were sent to the isthmus who were not bad enough to discharge, yet were thoroughly incompetent. He said it had been

RECORD OF MACHINERY EQUIPMENT
STATIONARY ENGINES, PUMPS,
I. C. R. R. CO. COMPRESSORS, ETC. MACHINERY DEP'T

NO. _____ (NAME)	
Builder, _____	Dis. of Cyl. _____ Stroke _____
Builder's No. _____	Type _____
Cost, _____	Horse Power, _____
Bought of, _____ Date _____	Rev. per Min. _____
Installed at, _____	Dis. and Width of Driver, _____
Transferred to, _____	Size of Steam Pipe, _____
Scrapped at, _____	" " Exhaust " _____
Sold to, _____	Builder's Drawing No. _____
Remarks, _____	Rate of Depreciation, _____

Card No. 7.

RECORD OF MACHINERY EQUIPMENT
STATIONARY BOILERS
I. C. R. R. CO. MACHINERY DEP'T

Builder, _____	Type, _____
Builder's No. _____	H. P. _____ Working Pressure, _____
Builder's Drawing No. _____	Heating Surface, _____
Cost, _____	Grate Area, _____
Bought of, _____ Date _____	Style Grate, _____
Installed at, _____	Diam. and Length of Tubes, _____
Transferred to, _____	Smoke Consumer _____
Scrapped at, _____	Dust Burner, _____
Sold to, _____	Stoker, _____
Remarks, _____	Safety Valve, _____

Card No. 8.

ILLINOIS CENTRAL RAILROAD COMPANY.

Boiler Water from _____ Division _____
Sample taken _____ 19 _____ Source of Supply _____

SCALE INGREDIENTS		NON-SCALING INGREDIENTS	
Insoluble Residue	.....	Chloride	.....
Silica	.....	Sulfate	.....
Iron and Alumina	.....	Carbonate	.....
.....	.....	Nitrate	.....
.....	.....	Organic matter	.....
.....	.....	Total Non-Scaling	.....
.....	.....	Suspended Matter	.....
.....	.....	Total Scaling	.....
.....	.....	TOTAL SOLIDS	.....

REMARKS: _____
ANALYZED BY _____ No. _____

Card No. 9.

No.	FIRM.	ADDRESS.

Card No. 10.

DR. No.	DATE	DESCRIPTION.	ENG. Nos.
E-7	2344 3/99	Driving Box	85-99

Card No. 11.

DR. No.	DATE	DESCRIPTION	CARS
F-1	1942 10/05	BOLSTER, TRUCK-30 TON COMMON SENSE	54001-54002 54901-55000

Card No. 12.

DR. No.	DATE	DESCRIPTION.	CARS-GLASS. ENG. Nos.
A-4	892 6/87	CAB	901-904
"	893 3/11	BOILER	301-306
"	894 9/09		

Card No. 13.

ROLL No.	DESCRIPTION.	REMARKS.
6 82	EXCURSION CAR PLANS	P.P. CAR CO

Card No. 14.

DR. No.	DATE	DESCRIPTION.	REMARKS.
F-3205 8/09		TWO RIBS LENGTHWISE 2 1/2" DEEP AT CENTER IN PLACE OF ONE 1 1/2" DEEP TO PREVENT BREAKAGE OF GRATE	B
HOMITH			

Card No. 15.

Dwg. No. D-6-3287			
DATE	DESTINATION	DATE	DESTINATION
3/19/03	BURNSIDE MM	2	

Card No. 16.

any confusion which might arise from the similarity of the two forms, card No. 11 is printed on salmon paper, while card No. 12 is white. As a check and a cross index, card No. 13 is used for both locomotive and car drawings, same being filed in numerical order.

Where foreign prints are preserved for reference, they are indexed by cards of the form shown on No. 14, alphabetically arranged according to the subjects. Class No. 11 to No. 14 inclusive are 3 x 5.

Occasionally it is desired to know upon whose authority or for what reason changes in drawings (or patterns) are made. Accordingly, when such changes are made, a brief description of the alteration, the drawing number, date and the name of the officer authorizing same are entered on a card like that shown on No. 15, bearing a serial number. This serial number is placed within a little circle drawn in the lower right-hand corner of the tracing. Should a discussion arise as to this particular feature on a drawing, by referring to the card index we find the necessary information.

Card No. 16 serves as a "follow up" system in connection with drawings issued with circular instructions. Cards of this form are filed in numerical order. They show the date issued, to whom sent and the number. They also serve the mechanical engineer or the chief draftsman as a check upon the person having the disposition of blue-prints directly in charge. They are 3 x 5.

In conclusion, careful investigation of each case and good judgment will always determine whether it is best to maintain a book record or adopt a card system.

Diversion of Cars.*

The following is an abridged record of the discussion at the meeting in regard to the diversion of cars on foreign lines away from the home road:

Mr. Drew (Wisconsin Central).—Every heart has its sorrows, Mr. President, and I have mine. My sorrow just now is diversion of cars. I have collected a few examples from our experience on this subject:

Road A. Large number of cars diverted to date. Thirty-seven individual cases taken up with the road. Some of these cars badly delayed before being moved to their connections.

Road B. Despite numerous promises our cars still move to their connections after being held on their rails some time, instead of being returned to us.

Road C. Several of our cars have been loaded back to New York and New England points from Chicago.

Road D. Thirty-five individual cases of diversion have been called to Mr. _____'s attention to date. He has repeatedly assured us that our cars would be looked after and returned. Reports received to-day, however, show he is still disregarding our requests and loading our cars away from us.

Road E. Sixteen of our cars have been loaded at their out-freight house at Chicago during the past three weeks.

Road F. Twelve of our cars loaded back east instead of being returned to us.

We sent a man around to personally look into the thing. He found two of our cars in a cut of 30 cars placed to a long freight house. He went to the yardmaster and said, "What are you doing with those two Wisconsin Central cars in there, loading them to the east, when we are just perishing for cars?" The yardmaster replied, "Do you suppose I am going to get an engine and haul out those 30 cars and switch out those two cars for you? They are in there and they are going to stay, and you will have to hunt them up when they come back." When you find that is occurring 20 or 30 times a day, it amounts to a good deal. What I object to is the seemingly conscienceless way people handle cars because they say they need them.

Another thing we have to contend with is this: We turn a car over to a switching road to be put at a certain place to be unloaded. By all the rules of equity that car ought to be brought back to us. Do you think it is? Not by a large majority. Those cars are simply gobbled up and taken away from us. We are in an unfortunate position because we originate a great deal of freight, and when our own cars are kept away from us, and especially in a shortage like the present, connecting roads will not furnish any of their cars, our business suffers very materially. We have certain embargoes in force now. We are obliged to say to shippers, you cannot load a car to such a railroad. They have five times as many of our cars as we have of theirs. It is a pretty strenuous thing to do. They say, "We have lost a good customer on that road if you will not let us load a car to them." They have to lose it.

Mr. Kearney (Baltimore & Ohio).—I presume the B. & O. is one of the roads that Mr. Drew has been hitting at, but I want to say that I think we held out as long as any road in the country did against this diversion. We were trying conscientiously to

handle cars correctly and properly, but when we found that all our appeals, penalty tracers, etc., were of no effect and we had 7,000 of our cars off the line, almost 10 per cent. more than in the previous year, our own people got so desperate that we could not control the situation. Then as to a remedy, I believe one must be provided, the matter is getting so serious. I have made a proposition to several of our connections looking toward some rule in regard to diversion, to experiment with. For instance, I made a proposition to three large systems that I would enter into an agreement with them under which I would have the right to prohibit the delivery of our cars to five connections, considering that five just for an experiment, and they would have the right to prohibit delivery of their cars to five connections, under penalty of \$1 per day until that car was returned either to home road or to our line. We wanted to see just how that would work out. We put a maximum penalty on the car of \$10. These roads are looking into it. I am open to an agreement with anyone who wants to take up the proposition. We have gone further. We have investigated, and I have to-day a list of roads that are not misusing our cars, and I have the promise of the management that those roads will be respected, and their cars will not be diverted.

Mr. Beecham (Chicago, Milwaukee & St. Paul).—I think it might be a good idea to try and obtain some reliable statistics in regard to diversions. I have no doubt at all but that as many cars are diverted in this day as ever, but I do not believe that there are any more. It seems to me that the results are about the same as they used to be. For example, we have cars that have been wandering aimlessly about the south for more than a year, and I had occasion not long since to appeal to a gentleman who presides over the destination of one of the southern lines, asking him to try and send home a certain furniture car. He promised that he would, but he said that it was a very difficult matter to get such a car as that north of the Ohio river, because it was constructed of Georgia pine, and the tendency was to stay in that section of the country. In like manner he said, he had a car west of the Rocky Mountains that was constructed of Oregon fir, and it was impossible to get it out of that climate. I have watched statistics in my office for some time, and I have found that the average of cars away from home from 60 days to 14 months, runs just about as it did eight or ten years ago. I have those statements on file and I occasionally look them over, and they vary but little. It has been said that people were diverting cars in order to avoid penalty. That may be true on some roads but I cannot see any necessity for it. The trouble is that none of us have absolute control over equipment. If we had, it must be plain that when we have a N. C. & St. L. car in our possession and have a load of freight going to Nashville or Atlanta or some other point down there, we would take that car and place it where that load could be put into it, instead of putting that car in local service in the direction in which it is to go, and placing one of our own cars for the Atlanta load. It requires the movement of an empty car here and another one there and a great deal of shifting around to get them where they ought to be placed. It would be a good thing if we could accomplish it, but we have no means of knowing where all the cars are, nor do we know where all the business is. And so, while we do not want our own cars to leave our line, they are constantly leaving it, and we are constantly getting other roads' cars on our line. In general we are trying to load foreign cars in the direction of home, and while I hear a great deal about putting merchandise shipments into them in order to switch them over to some other railroad for the purpose of avoiding the dollar a day, I do not think there is very much to that. I know that there is not much of it on our line. If we have a foreign car on our line and it is under penalty, we try to get it somewhere where we can load it in the direction in which it should go.

Mr. Drew (W. C.).—The point on diversion is not simply avoiding penalty. What we object to and what we suffer from is, we get our cars away down east, and we labor with the eastern lines to get those cars started west. We get them up to Chicago and we begin to feel happy. They get to Chicago, but we never see them. They are shot back to the eastern states again on the road that brought the cars in. That is an abuse it seems to me that ought not to be allowed, and any road which does that I think is certainly treating its neighbors unfairly. And yet such diversions are constantly being made. I have 65 instances in which cars of ours were loaded at freight houses with merchandise inside of three weeks, all over this country, and by almost every road that runs into Chicago.

Mr. Liggett (St. Louis Southwestern).—This subject under consideration comes very close home to us. As the matter now stands we have 60 per cent. of our equipment away from home and can get but a very small proportion of it back. We have three times as many of our cars away from home as we have foreign cars on the line, and the result is that our local business is seriously crippled. We have used every honorable means to induce connections to return our equipment, but with poor success. I question very much if, in times like this, when industries are suffering and the roads have not equipment to do the business, a penalty for

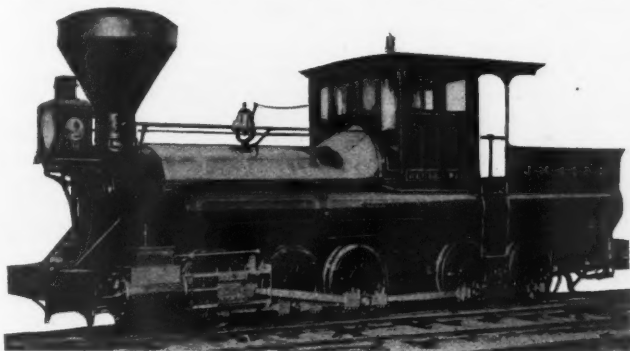
*Extracts from the report of the proceedings of the Association of Transportation and Car Accounting Officers, at St. Louis, Nov. 21 to 22, 1905.

diversion or an increase in the per diem rate, would contribute to bring cars home.

Mr. Wrenne (Nashville, Chattanooga & St. Louis).—When people say that cars cannot be worked home it is not fair. They can be worked home if the people pay any attention to it. But if the superintendents of transportation will wink at such matters, it will continue. There is already a car service rule that cars shall not be diverted. There is no attention whatever paid to it, not a particle, and if the officers and members of this Association will go before the American Railway Association, I think some attention will be paid to it. The members of the American Railway Association understand the importance of this as well as we do. If people who own cars can have their cars brought home, they can do their business. If not, they cannot.

A Historic Locomotive for Purdue University.

By the courtesy of the Pennsylvania Lines, and especially as a result of interest shown by Mr. D. F. Crawford, General Superintendent Motive Power, Purdue University has been able to add a machine of more than passing interest to its collection of historic locomotives. This latest acquisition, which is the sixth locomotive to take its place in the Purdue museum, is the "Reuben Wells," which was built in 1866 by what was then the Jeffersonville, Madison & Indianapolis Railway Company, for use on the "Madison incline." Its appearance when new is shown by the photograph accompanying. Somewhat recently it was remodeled, the rear end of the frame having been cut off, the number of axles



Tank Locomotive, Built for Jeff., Mad. & Ind. R. R., 1868.

reduced from five to four, and a saddle tank placed over the boiler. The engine as it now appears is shown by photograph, Fig. 2.

The scene of this engine's activity was in the immediate vicinity of the city of Madison, Indiana, a place of considerable commercial activity rather early in the last century. Located upon the Ohio river and surrounded on the east, west and north by hills rising to a height of over 400 ft., Madison was easily accessible from the water, but the steep hills on all of the roads leading away from the town made it difficult to distribute merchandize to the interior. After a long process of agitation the construction of a railroad, afterward known as the Jeffersonville, Madison & Indianapolis, was undertaken. The initial portion of this road was finished in 1841. The portion then completed consisted of a mile and a quarter of track rising almost uniformly at the rate of 310 ft. to the mile, or with a grade of 5.89 per cent. This incline was designed and for many years was operated as a rack and pinion road, the first locomotive having been built by the Baldwin Locomotive Works and delivered from Philadelphia to Madison by water. Some years later when Mr. Reuben Wells had become Master Mechanic of the J. M. & I. Railroad Co. he became convinced that by the use of a properly designed locomotive, the rack and pinion might be dispensed with. As a result of his conviction he designed and built the locomotive which has now been presented to Purdue University. This engine when put to work performing a service with plain wheels which had previously involved the use of gears, was justly regarded as a machine of remarkable capacity. It was, in fact, a most excellent adaptation of the means to an end, the significance of which becomes greater when it is remembered that it was put in service in 1868, or nearly 40 years ago.

The successor of Prince Khilkov as Russian Minister of Transportation is K. S. Nemyeshayev, who was General Manager of the Southwestern Railroads, where Count Witte made his reputation as an administrator. The new Minister has made a statement of the causes of the periodical car famines in Russia which has attracted much attention, and modifies the common judgment that it is chiefly due to incapacity and negligence. Some of these causes are due to the character of the country and the circumstances of the grain growers. The latter are mostly very poor and cannot

provide granaries for storing their crops, and they therefore hasten to haul their grain to the stations in the few weeks between harvest and the time when the fall rains make the Russian roads impassable. If they could wait till winter, they could haul with sleighs till spring. Then the outlets for grain on the frontier are comparatively few in number, and their elevators are soon filled, and shipments cannot be made as fast as grain arrives, so that even with a greatly larger number of cars, shipments from interior stations cannot be made. No Russian grain port is ice-free all winter, though the harbor of Odessa is usually closed but a few days; and this, of course, greatly limits exports in winter. Before the late railroad strike there were about 170,000 car loads of grain waiting to be forwarded at interior stations. We may imagine that things have not mended since.

Washington Correspondence.

WASHINGTON, Feb. 6.—It cannot be said that the Hepburn railroad rate bill has been strengthened by the House debate. On the contrary, it has been so severely criticised, not only by its opponents, but by its supporters as well, that if it had not been understood that it is to be made over by the Senate there would have been strong pressure for amendment in the House. As was indicated in the report of the House Committee, the bill in its present form is not satisfactory to any one—not even to Representative Hepburn, whose name it bears, or to any other member of the committee from which it was unanimously reported. It will serve the purpose for which it was intended, however, that of giving the advocates of rate legislation in the House something to vote for, and it will then be sent to the Senate where the real bill will be made. Representative Grosvenor, of Ohio, spoke for many of his associates as well as for himself when, after a speech of severe criticism of the bill, he declared that he would vote for it, as he believed it should be sent as speedily as possible to another body where it would not be subject to such iron-bound treatment as in the House. Mr. Grosvenor went further than any other critic of the bill in declaring that the railroad rate issue was a "fake issue."

Much of the serious criticism of the Hepburn bill has been directed against its failure to provide for an effective review by the courts of the orders of the Commission. As the debate has progressed it has been made apparent that those members of the House who have seriously studied the provisions of the bill are satisfied that no order of the Commission changing rates could be reviewed by a court unless it could be alleged that the rate made by the Commission was so low as to be actually confiscatory. It has been contended that it would be impracticable to obtain a review even on the ground that the rate was confiscatory, for the reason that the penalty provided for failure or neglect to observe an order of the Commission would be so heavy as to deter the railroad from going into court unless it were willing to put the Commission-made rate into effect pending the review—a course that the road would be reluctant to adopt on account of the extreme difficulty that would be encountered in restoring a rate that had been lowered for any considerable length of time and to which related rates on the same road and on other roads had been adjusted. The bill seems to contemplate the possibility of a court's enjoining the order of the Commission in some way pending the appeal, but it is contended that this could not be done for the reason that there would be no one against whom the injunction could be effectively directed. It is pointed out that an injunction directed against the Commission would be of no effect, for the reason that the Commission is not required to perform any act to put an order into effect, the order being self-executing and the penalty beginning to apply without any further action by the Commission upon the date fixed for it to take effect. If this construction of the bill is correct it would justify Mr. McCall's declaration that it would give the railroad a chance to apply to the courts on peril of its life. In the case of an order that would put into effect rates which would bankrupt the road, it could take its choice between being put into bankruptcy by obeying the order or taking the risk of being bankrupted by the penalty if the court should chance to sustain the Commission.

These arguments have not been without effect on the opinions of Representatives, but they have not changed votes. All except a small minority of the members of the House have been determined from the beginning to vote for any kind of rate bill that might be endorsed by the committee, believing that the bill would in any case be made over to meet the wishes of a majority of the Senators. The Senate Committee is to take up the task of making a bill on Friday of this week and is to continue its sessions from day to day until February 16, when it is to vote on reporting a bill. There is no formal work being done by the committee this week, but a great deal of quiet work is in progress and efforts are being made to change the views of Senators who are members of the committee and those who are not. The principal fight in the committee is to be over the question of whether or not provision

is to be made in the bill to be reported for the determination by a court, at some stage of the proceedings, of the judicial question of whether or not a rate called into question is unreasonable. Senators Elkins, Foraker, Aldrich, Kean and Crane, of the Republicans, will stand out firmly for a provision that will bring this question before the courts in some way. It is possible that they may receive some Democratic support. None of the Democratic members of the committee has yet publicly announced his position on this question, but it is understood that Senators Foster, of Louisiana, and McLaurin, of Mississippi, are disposed to favor giving the courts this power, though they may not go to the extent of helping the majority of the Republicans to report a bill containing this provision. It is still possible that there may be several committee reports without a majority in favor of any one bill.

It is generally expected that Senator Knox, of Pennsylvania, will have as much to do with framing the bill to be passed by the Senate as will any other man, though he is not a member of the Committee on Interstate Commerce. The reason for this is that it will be believed that any proposition he may favor will have the approval of the President. Senator Knox does not seem to be in complete harmony with the President at this time, however, for he has let it be known that he favors provision for an effective review, while the President is disposed to believe that no more right of judicial review should be given than would be afforded by the Hepburn bill. This opinion is not shared by any member of his cabinet, however, except Attorney-General Moody. The members of the Cabinet who do not agree with the President are naturally refraining from expressing their views for publication, but it is understood that some of them differ so widely from the President as to favor the Foraker bill, which proposes to have all questions as to unreasonable rates and other alleged violations of the law dealt with by the courts in the first instance and makes of the Commission little more than an investigating and prosecuting body.

J. C. W.

The Effect of Nitrogen on Iron and Steel.

In a brief monograph Dr. Hjalmar Braune recently discussed the effect of minute quantities of nitrogen on iron and steel. For the past 20 years the abnormal brittleness of these metals, especially when produced by the basic process, has attracted especial attention. The author states that he has been engaged in the investigation of this phenomenon for the past six years and has come to the conclusion that this accidental brittleness is occasioned by the presence of the nitrogen that the metal has taken up during the different periods of its manufacture.

This nitrogen is only found combined with pure iron ferrite, forming a nitrate of iron of which the carburets, such as cementite, are entirely free. The nitrate of iron exists in solid solution in the ferrite, whose melting point it lowers and at the same time its dissolving properties for the carburet of iron. In this respect, the nitrogen exerts a marked influence on the quality of the metal, upon soft iron as well as upon hard steel and castings. This has been proven by the following experiment.

Test pieces of the best quality of iron and steel have been heated in ammonia to the temperature of 1,475 deg. F. for varying lengths of time, so as to cause a larger or smaller quantity of nitrogen to combine with the iron. The same test pieces have then been reheated in sand, so as to secure a homogeneous distribution of the combined nitrogen throughout the metal.

In the case of test pieces having the following composition:

Carbon.....	0.060 per cent.	Sulphur.....	0.005 per cent.
Silicon.....	0.010 "	Phosphorus.....	0.050 "
Manganese.....	0.060 "		

it was found that the quality of the metal varied as the proportion of nitrogen increased. For proportions ranging from 0.07 to 0.08 per cent. of nitrogen, a break in the continuity of the elongation is observed, which for the higher percentages of nitrogen falls rapidly to nothing. The metal then cracks along the whole surface of the test piece. Such pieces had been charged with nitrogen by heating in ammonia to 1,475 deg. F., but because of the limited time during which they were reheated the surface contained a higher percentage of nitrogen than the interior.

The transformation of the metal, as the proportion of the nitrogen increases, can be readily followed photographically. The metal first used was composed of large grains with a uniform surface. As the amount of nitrogen increases, the interior aspect of the grains is modified and lines like streaks of corrosion appear between them, at the same time the size of the grains decrease. It will also be noticed that while some of the grains retain their original appearance, others are completely changed.

When the quantity of nitrogen has risen to from 0.07 to 0.08 per cent. the grains are very small, scarcely one-tenth their original dimensions; at the same time the cement that fills the joints between them has increased in thickness. As soon as this structure has been developed the metal becomes exceedingly fragile.

When the amount of nitrogen has been still further increased up to 0.20 per cent. the cellular structure disappears entirely, and in its place there are a series of small dark, rectilinear lines which

have the appearance of perlite more or less clearly defined. In the passage from the cellular to the entectic structure the contour of the cells can be seen to become marked, divided and separated into small rectilinear lines or bars.

The conclusion reached from an examination of this cellular structure shows that there is a very clear relationship between it and the elongation of soft iron. The larger the cells the more ductile the metal. The cement forming the joint between the cells contains the impurities of the iron. The amount of nitrogen contained in metal produced under ordinary industrial conditions very rarely amounts to as much as 0.07 per cent.; but in very soft metals, especially in Lancashire iron, the lower percentages are quite sufficient to make the metal brittle.

In order to study the influence of nitrogen upon the hard steels, one was taken having the following composition:

Carbon.....	1.15 per cent.	Sulphur.....	0.012 per cent.
Silicon.....	0.20 "	Phosphorus.....	0.025 "
Manganese.....	0.45 "		

This was treated to increasing quantities of nitrogen by heating in ammonia as before. As in the case of soft iron, the tensile strength increased at first with the increase of nitrogen, at the same time the elongation decreased; until, suddenly, when the amount was between 0.030 and 0.035 per cent. the elongation almost entirely disappeared; and the metal became decidedly brittle.

With a steel of 0.50 carbon, the critical point, corresponding to an entire disappearance of its malleability, was attained when the content of nitrogen was between 0.040 and 0.045 per cent., and finally for steel of 0.20 carbon the same point was reached with from 0.05 to 0.06 per cent. of nitrogen. In every case, the sudden appearance of this brittleness corresponds to a change of structure. Metals as ordinarily produced rarely contain 0.06 per cent. of nitrogen, though those with from 0.03 to 0.04 per cent. are common. It is for this reason that the hard steels become brittle more easily than the soft ones, because their critical content of nitrogen does not vary as much from that which is ordinarily in them.

Nitrogen thus exercises an important influence on tempered steels. The nitrate of iron, in this case, is found in solution in martenite, just as it was in the ferrite of the reheated steels. The influence of the nitrogen upon the electric and magnetic properties of steel is also considerable. In soft iron especially the coercive force and hysteresis is increased.

Pig Iron and Rail Production in 1905.

The Bulletin of the American Iron and Steel Association prints the following statistics of pig iron and rail production in the United States during 1905. The collection of unsold pig iron stock statistics has been abandoned.

The total production of pig iron was 22,992,380 gross tons, against 16,497,033 tons in 1904, 18,009,252 tons in 1903, and 17,821,307 tons in 1902. The following table gives the half-yearly production in the last four years in gross tons.

Periods.	1902.	1903.	1904.	1905.
First half	8,808,574	9,707,367	8,173,438	11,163,175
Second half	9,012,733	8,301,885	8,323,595	11,829,205
Total	17,821,307	18,009,252	16,497,033	22,992,380

The production of 1905 was not only much the largest in our history but it exceeded that of 1904 by 6,495,347 tons, or over 39 per cent. The year of next largest production was 1903, when 18,009,252 tons were made. The increase in production in 1905 over 1903 was 4,983,128 tons, or over 27 per cent. The production in the second half of 1905 was 666,030 tons more than that of the first half. The total production by states is shown in the subjoined table.

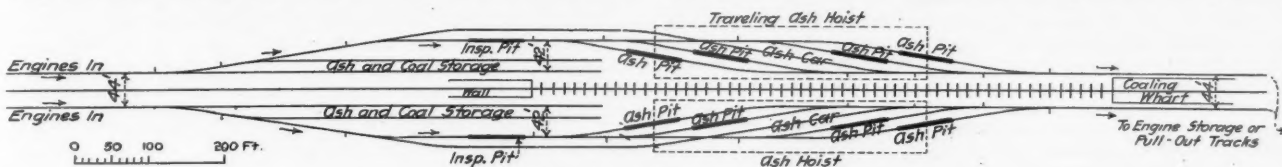
States.	Blast furnaces—			Production,		
	In blast			gross tons of 2,240 lbs.		
	Jun. 30, 1905.	Dec. 31, 1905.	Total.	First Half 1905.	Second Half 1905.	Total for 1905.
Massachusetts	1	1	2	7,636	8,351	15,987
Connecticut	2	3	5			
New York	13	14	27	550,208	647,860	1,198,068
New Jersey	6	5	11	165,991	145,048	311,039
Pennsylvania	124	126	250	5,226,691	5,352,436	10,579,127
Maryland	3	4	7	156,334	175,762	332,096
Virginia	15	14	29	240,672	269,538	510,210
North Carolina	0	0	1			
Georgia	1	3	4	25,752	12,947	38,699
Texas	1	0	1			
Alabama	29	30	59	743,547	860,515	1,604,062
West Virginia	2	4	6	149,016	149,163	298,179
Kentucky	2	3	5	32,793	30,942	63,735
Tennessee	15	12	27	195,757	176,935	372,692
Ohio	42	55	97	2,181,058	2,405,052	4,586,110
Illinois	19	17	36	979,157	1,055,326	2,034,483
Michigan	9	9	18	147,953	140,751	288,704
Wisconsin	6	6	12	184,234	167,181	351,415
Minnesota	0	1	1			
Missouri	1	2	3			
Colorado	3	4	7	176,376	231,398	407,774
Oregon	0	0	1			
Washington	0	0	1			
Total 1905	294	313	607	11,163,175	11,829,205	22,992,380
Total, 1904	216	261	477	8,173,438	8,323,595	16,497,033

The production of Bessemer and low-phosphorus pig iron in

1905 was 12,407,116 tons, against 9,098,659 tons in 1904, an increase of 3,308,457 tons, or over 36 per cent. The production of basic pig iron in 1905, not including charcoal of basic quality, was 4,105,179 tons, against 2,483,104 tons in 1904, an increase of 1,622,075 tons, or over 65 per cent. The production of charcoal pig iron was 352,928 tons, against 337,529 tons in 1904, 504,757 tons in 1903, and 378,504 tons in 1902. The production in 1905 was 15,399 tons more than in 1904, but it was 151,829 tons less than in 1903 and 25,576 tons less than in 1902. The production of spiegeleisen and ferro-manganese was 289,983 tons against 219,446 tons in 1904, an increase of 70,537 tons. The production of ferro-manganese alone was 62,186 tons, against 57,076 tons in 1904. One company produced 1,243 tons of ferro-phosphorus in 1905, against a similar production of 946 tons in 1904. Another company reported a production of 2,750 tons of ferro-Bessemer in 1905, but did not report any iron of this grade in 1904. These figures are not included in the spiegeleisen and ferro-manganese reported above.

The whole number of furnaces in blast on Dec. 31, 1905, was 313, against 294 on June 30, 1905, and 261 on Dec. 31, 1904. The number of furnaces in blast at the end of 1905 was larger than at the close of any year since 1891, when exactly the same number of furnaces were active.

The production of all kinds of rails in the United States in 1905 was 3,372,257 gross tons, against 2,284,711 tons in 1904, an increase of 1,087,546 tons, or 48 per cent. This is the maximum production in any year. The year of next largest production was 1903, when 2,992,477 tons were made. The increase in 1905 over 1903 amounted to 379,780 tons, or over 12 per cent. Rails rolled from purchased blooms, crop ends, "seconds," and rerolled, or re-



Ash Pit Arrangement for a Terminal Yard.

newed, rails are included. Renewed rails are rails that have been in use and after reheating are rolled down to smaller sections.

The following table gives the production of all kinds of rails in 1905 according to the weight of the rails per yard. Street rails are included.

Kind of rails.	Bessemer.	Open-h'rth.	Iron.	Total.
Under 45 lbs.	209,853	16,409	318	226,580
45 lbs. and less than 85	1,468,123	131,501	0	1,599,624
85 lbs. and over	1,510,699	35,354	0	1,546,053
Total, gross tons	3,188,675	183,264	318	3,372,257

In the following table the production of all kinds of rails in 1905 is given by states.

States.	Bessemer.	Open-h'rth.	Iron.	Total.
Pennsylvania	1,095,154	18,687		1,113,841
Other States	2,093,521	164,577	318	2,258,416
Total, gross tons	3,188,675	183,264	318	3,372,257

Twenty-four plants in 12 states rolled or re-rolled rails in 1905, as follows: New York, 1; Pennsylvania, 5; Maryland, 3; West Virginia, 1; Georgia, 1; Alabama, 3; Ohio, 4; Illinois, 2; Wisconsin, 1; Colorado, 1; Washington, 1, and California, 1.

The production of Bessemer steel rails amounted to 3,188,675 gross tons, against 2,137,957 tons in 1904, an increase of 1,050,718 tons, or 49 per cent. In the following table the production of Bessemer steel rails is given by states from 1902 to 1905.

	1902.	1903.	1904.	1905.
Pennsylvania	1,148,425	1,186,284	801,637	1,095,154
Other States	1,786,967	1,760,472	1,336,300	2,093,521
Total gross tons	2,935,392	2,946,756	2,137,957	3,188,675

In addition to Pennsylvania the states which made Bessemer rails in 1905 were New York, Maryland, West Virginia, Georgia, Ohio, Illinois, Wisconsin, Colorado, and Washington.

The total production of open-hearth steel rails in 1905 was 183,264 tons, against 145,883 tons in 1904, 45,054 tons in 1903, 6,029 tons in 1902, 2,093 tons in 1901, and 1,333 tons in 1900. The maximum production of open-hearth rails was reached in 1905; the year of next highest production was 1904. Alabama rolled almost all the open-hearth rails that were rolled in 1905 and 1904, Pennsylvania rolling the remainder in 1905 and Pennsylvania and Colorado in 1904.

The production of iron rails in 1905 was 318 tons, all rolled in Alabama, Ohio, and California, and all weighing less than 45 lbs. to the yard. In 1904 the production was 871 tons.

The demand by shippers for cars on the Prussian State Railways last December was 28 per cent. greater than the year before. In November 197,633 carloads of beet roots alone were forwarded, which is 32 per cent. more than the year before. These are usually hauled but short distances.

Locomotive Handling at Terminals.

BY W. A. MAC CART.

In times of freight blockades, such as have occurred in recent years, the energies of all transportation officials are bent to ascertain and remove, so far as can be done, all causes tending to congestion, and to improve the service in all directions. Prompt handling of motive power is a first essential in moving congested freight, so that the engines may be cleaned, coaled and turned and made ready for service without delay. This means providing not only good facilities for each of these purposes, but it means having them so located as to be readily accessible.

The writer has known of instances where, during these strenuous times, engines have made a return trip over divisions of the road running backward because if permitted to try to reach a turntable they would be so hemmed in by other movements and the cramped surroundings that there was no assurance when they could be gotten back to the main tracks ready for a trip. These delays sometimes amount to three and four hours, when one hour should have been sufficient for the required purposes; and the facilities themselves are usually to blame. With this in mind, a plan is submitted which it is believed will, without requiring a large amount of room, tend to expedite at least the cleaning and handling of the engines at the coaling wharf.

The plan needs no explanation, being a series of parallel ash pits holding one engine each. This will permit of any particular engine that may be specially needed receiving prompt attention and returning to its service instead of having to wait behind a string of three or four already on a single track ash pit. The

space required is very little more than would be needed for the usual design of two parallel ash pit tracks of the same standing room with an ash car track between them. With a track layout of this design, so located that it would be easily accessible by engines coming from or going to trains, any locomotive should be made ready for a return trip in a minimum of time.

Industrial Railroads and Car Service.*

The subject of industrial railroads and their relation to car service and per diem charges was taken up. The following are extracts from the discussion:

Mr. Daly (Illinois Central).—The question has been discussed by several Chicago railroads as to what the difference is between a non-per diem road and an industrial road. For example, we have connection with the Pullman Railroad at Chicago and with the Illinois Northern Railroad. If the New York Central loads a car to either of these railroads, or if it comes to Chicago and we re-consign it to either of these railroads, we pay the per diem while that car is on the Illinois Northern or the Pullman Railroad, simply because we class them as industrial railroads. Now take a smaller road located at New Orleans or Louisville or Atlanta or San Francisco, under exactly the same conditions: They are classed by the roads in that territory as non-per diem roads. Hence if we load a car to them, we have got to stand the per diem on it. Now should there be any difference between an industrial road at Chicago and an industrial road at Atlanta, or a logging road that is not eligible to per diem and cannot get in. Still, because we connect with these railroads at Chicago and they are termed industrial roads by the Chicago railroads themselves, it obligates the road that delivers to them (not the road that loads the freight) to pay the per diem on the car, whereas if we did not class them as industrial roads we would save the per diem we are now paying. I believe if one section of the country bears the per diem on cars, the other section of the country ought to do likewise. I should like to ask if the Chicago, Milwaukee & St. Paul considers it fair that when we deliver them an Illinois Central car going to the South Dakota Central and they assume the per diem on that car while it is on the South Dakota Central tracks and pay it to us, and then the next week they give us one of their cars going to the Georgia Central, which is an identical railroad to the South Dakota Central in every sense, but which we have not seen fit to classify as an industrial railroad, is it fair that we should collect per diem from them on our car, and refuse to pay them per diem while their car is on our tracks?

Mr. Prall (Pittsburg Car Service Association).—I have been

*Extracts from the proceedings of the Association of Transportation and Car Accounting Officers, at St. Louis, Nov. 21 to 22, 1905.

very much interested in hearing the discussion on industrial and non-per diem roads. An understanding of the industrial and the non-per diem road to me is absolutely necessary in conducting car service. A car service rule applied as an industrial rule is per diem pure and simple, with free time allowed and \$1 charge, instead of no time allowed and 20 cents a day charge. The industrial rule is applied during the entire movement of the car—the loaded car in, the detention of the car while on the track of the industry, and the return of the empty car. It has to be applied to an industry exactly in the same way as the per diem regulation to a connecting line, using the same report. No matter what the industry may do with that car while in its possession, that car is charged for after the free time expires, at the rate of \$1 per car per day. If the car is held 60 days it gets the free time, which is the regular time allowed to everybody for the unloading of the car, or the regular time allowed for the loading of the car, and one day for the switching of the loaded car, and one day for the return of the empty. It is the acknowledgment of the same principle that has been granted in switching service by the American Railway Association; four days reclaim. Four days besides the day of the offering and the delivery of the car. Now you can take the industrial rule and apply it to what they call non-per diem roads, because non-per diem roads are nothing in the world but industrial roads, and if the non-per diem road is long enough and it requires two days for the load and two days for the return of the empty, you have the right to allow it to them under the car service rules. That is, the regular time and the necessary time for switching the load and for the return of the empty. There is no difficulty in understanding the industrial rule, and that the non-per diem road is an industrial road. If it is not, why is it not admitted into the American Railway Association? In handling the business of the United States Steel Corporation, the corporation, and all its plants (and I have 27 in my territory), are all handled under the industrial rule. I have a form called 520 which is nothing but an interchange report put in book form. Every car is recorded on Form 520, and the carbon is turned over to the representative of the plant, and every one of those plants makes the same report on my form and turns the carbon over to the agent when they return the car. It is absolute per diem. In handling those industries we have another form which we call 510, which is an offering form. We offer all cars we cannot place on interchange tracks, giving the car number and initials, and all those cars are again recorded on the interchange report, Form 510, and every car received in the Pittsburg territory is recorded from time of actual receipt. Not an imaginary receipt. We follow that up with Form 510, recording actual detention, from actual receipt to actual placement on interchange and actual return of the car to the rails of the railroad. I do not mean to say in making that statement that in the report of the railroad detention in switching service, we report the time consumed in the return of the empty car. That is never done and cannot be done under car service rules and regulations on any car. If you stop and think you will see that the car service regulations and records only show records to the time of unloading of the cars. Consequently in applying the industrial rule to the plant, the detention is only reported to the time of unloading of the car, but if the car is not returned after unloading within one day there is a charge of \$1, and no detention is shown for that empty car movement. You must remember, in order to understand my statement, that in determining the length of time for handling a car in switching service you must multiply the railroad detention by two. In some districts by three, where you move your empty cars when you get ready. Under the industrial rule, if the empty car is not taken from the track where it is unloaded by the engines in the service of the industrial company automatically, the industrial road is charged for the failure to promptly move the car back to interchange, and in that way the industrial rule as a car service rule is far in advance of any other car service rule that is applied in any Association. It is per diem pure and simple.

Mr. Johnson (Chicago, Rock Island & Pacific).—Are we to understand that Mr. Prall advocates having only two methods of handling the per diem question? I judge he believes he can include all railroads not signers of the per diem agreement under his industrial rule.

Mr. Prall (P. C. S. A.).—Yes, I desire to make that a positive statement. For instance, there is one road in the Pittsburg territory that delivers to another road. The first road is 10 miles long, the second 15. There will be no difficulty in handling it, the second road having an additional day, the first road being responsible for the maintenance of its record for deliveries to the other road under the industrial rule. Again, the New Haven & Dunbar operating under the industrial rule, makes deliveries to nine different plants connecting with its rails. They run a regular car service record with all their plants and apply the regular rule, called by us "I A," allowing 48 hours for the loading or unloading of cars, and collecting car service themselves. They pay under the industrial rule for the detention of any car, either on their own

rails or on the rails of the industries they serve, they accepting all responsibility for their service. Where the industrial rule has been introduced, delays have been reduced 90 per cent. In this connection there is one thing I should like to point out. Every railroad is perfectly willing under per diem, to have the switching road return its cars in two days even if it is a four-day reclaim, and make 40 cents on the movement, the idea being that the return of the car quickly is well worth the 40 cents. It is the same way under the industrial rule. If a car is placed to-day at any time it is recorded as to-morrow. We give them to-morrow. We do not count the first day. If they can place that car the day they receive it they will charge for it. If it is detained on an industry track for three days, they collect a dollar and they can bring the car back and give it to the railroad and they do not owe the railroad anything. It is an inducement to move the cars just as fast as they can, and they do it. The free time is one day in addition for the load, and up to 4 o'clock of the day after the recorded release of the car for the return of the empty. Four o'clock means the railroad has a right to begin checking at 4 instead of 6 o'clock. It means a day. If you deliver a car on Monday under per diem and they bring it back that day there is no charge. If they bring it back Tuesday, there is a charge. If you place a car on Monday under ordinary car service rules, the time begins at 7 a.m. Tuesday. If you give the industrial road the car on Monday I record it as placed at 8 a.m. Tuesday. We calculate from the next 7 a.m., so we calculate from 7 a.m. Wednesday, giving them Wednesday and Thursday. If the car is returned on Friday by 4 o'clock we record it as released the previous night at 6 o'clock. That is to keep down the car service charge and makes plain that we cannot calculate the time for the return of the empty. If we did, we should have a complication. We have to remember always the free time as it expires under the direct rule, which is the rule allowing 48 hours. If you go over it again you will see that it is the reclaim allowance. You give a car to a connection in switching service. You allow them four days reclaim. Under the industrial rule practice as we apply it we allow them simply undertake to do, but the other party doesn't carry out his part.

Mr. Elliott (Illinois & Iowa Car Service Association).—The industrial rule ought not to be difficult to understand. Its purpose is simply to give time enough to do the work, in addition to the regular car service time allowed free. The distinction between per diem rules and the industrial rule, is that the per diem rules are a matter of agreement between you, which you agree to abide by, while the industrial rule is something you put upon someone, who may or may not carry it out. In regard to the Illinois Northern case that Mr. Daly spoke of, it would be a very simple matter for the railroads to say, "You may have that car so long; after that you will pay \$1 a day for it." That is simple enough, but getting the dollar is another matter. You bump up against traffic arrangements and the other departments. There are lots of industrial rules that are applied and you are able to enforce the collection. There are other industrial rules that you may want to apply, or may apply without getting any money. There is a great distinction there between the agreements on per diem, which are agreements among you, and the industrial rule, which is something you simply undertake to do, but the other doesn't carry out his part.

Mr. Prall.—The per diem rule has a most distinct advantage, in that it is a matter of agreement—signed agreement. It is a contract between railroads that must be lived up to. That car service, whether it is an industrial rule or any other rule, is a question of law. It is a question of the understanding of the railroads of their own interests, and where the railroads have such a record that they can and do proceed to the end of collecting their just demands, there is no distinction between the charge of \$1 a car per day as charged to an industrial road, and as charged to any corporation or individual. The difficulty is invariably in the application of a car service rule that we may have to sustain our contentions in the courts. We must sustain our position as being always equitable, applying reasonable rules and regulations, so that it can be proven, not that those rules are expedient, but that they are of mutual advantage to the community and the railroads. We have to apply those rules which give the least annoyance to the consignee and in such a way that they are not only applied to the consignee but to the railroad in its service, so that through the application of the rules the railroad improves the service to the satisfaction of the consignee, which ends in the co-operation of the consignee with the railroads.

Mr. Daly (Ill. Cent.).—I should like to ask Mr. Prall if he has any industrial lines that have refused to pay him car service according to his car service rules.

Mr. Prall.—Yes, in the past, but now the rule has been agreed upon.

Mr. Daly.—Has the average number of days been knocked out?

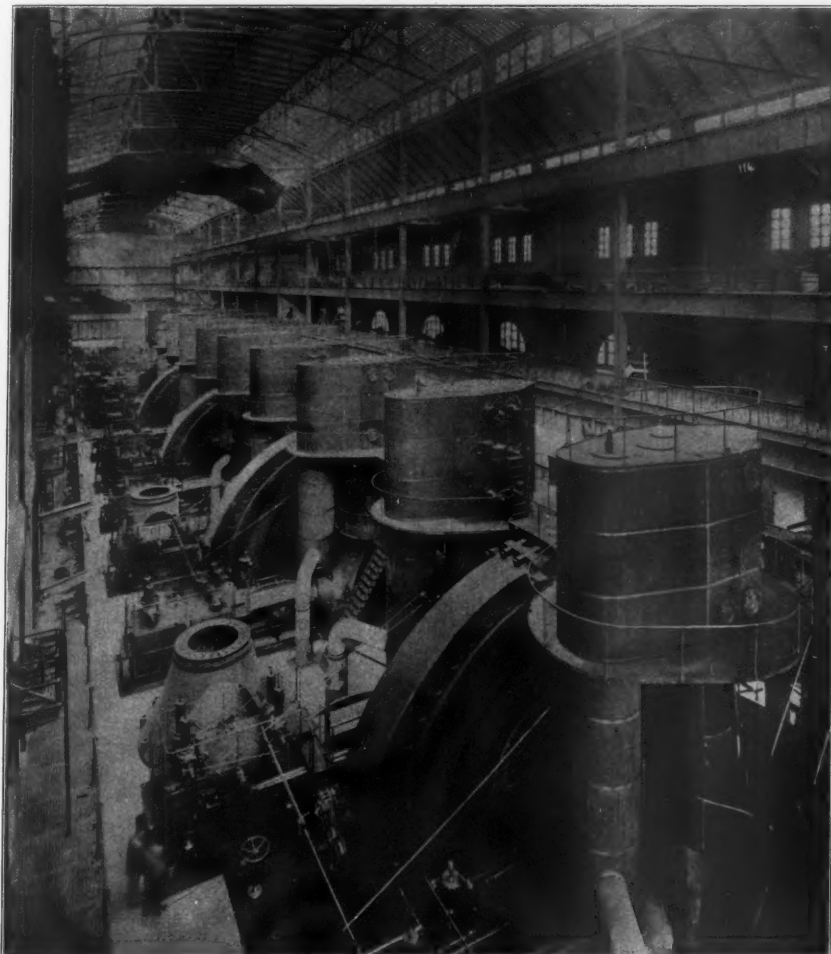
Mr. Prall.—I knocked the average time out in the very first notice that I promulgated as car service commissioner. The biggest

kind of a row was raised, but now there is not an industry that wants to go back to the average time. The actual time and the average time of the United States Steel corporation has been reduced in consequence from between five and six days to less than two.

Engine Failures.

Mr. M. K. Barnum, Assistant to the Second Vice-President of the Chicago, Burlington & Quincy, addressed the engineering students of Purdue University on this subject January 29. The importance of the subject was emphasized by a statement to the effect that the proportion of engine failures to mileage is to some extent an indication of good or poor management, though the possibility

factory condition but delays occurring through inattention or faults on the part of the crew. He said also that the reverse conditions sometimes existed, that through prompt and wise action on the part of the engineer, a technical failure may be actually avoided. Failure of the first class occurred when an engineer brought his engine back to the roundhouse because of an alleged failure of injectors, whereas in fact the injectors were in working order but were not properly handled. This, he said, while recorded as an engine failure, was really the failure of a man. As an illustration of the manner in which a technical failure may sometimes be avoided, a case was cited where an engine within four miles of a terminal broke its piston rod; the cylinder head, piston and rod all being blown clear of the engine. The engineer knowing that all harm had been done which could be done, held his throttle open and got into the terminal on time, thus avoiding a technical failure, notwithstanding the fact that there was actual and serious breakage of parts. In conclusion, attention was called to the extremely satisfactory records which many roads are now enjoying with reference to engine failures. The speaker considered a good record to be one which permits a mileage of 10,000 miles per failure, yet some roads are to-day operating with less than one failure to 15,000 miles.



Six of the Nine 1,200-h.p. Allis-Chalmers Engines—Fifty-Ninth Street Power Station of the Interborough Rapid Transit Company, New York.

of an epidemic of failure under the best of management was admitted. "Practice," he said in defining failures, "varies greatly." A broad definition counts as failures all delays of any account whatever chargeable to engines. Another and a much narrower one is, a delay of more than five minutes to a passenger train or of more than ten minutes to a freight train at any one point due to broken, defective, or lost parts of machinery, hot bearings or leaky boilers. A generally accepted definition which lies between these limits makes a failure any defect in an engine or its mechanical operation which causes it to lose time or make stops which would otherwise be unnecessary. The speaker discussed the effect of engine failures upon the cost of operation, loss of business and the movement of traffic; he then analyzed the causes leading to such failures and described the manner in which failures are reported and the methods by which the higher officials handle the statistics of them. Attention was called to the importance of shopping engines at proper intervals. Large engines in freight service require to be shopped after running from 45,000 to 60,000 miles, while smaller engines in lighter service will frequently run for 75,000 to 125,000 miles between shopping. A careful study of the requirements of different classes of engines with reference to shopping will greatly assist in reducing failures on the road.

In his discussion of details it was shown that technical failures of engines were often failures of men, the apparatus being in satis-

given in the following table:

Duration	15 hrs.
Load	5,079.2 K.-W.
Friction and generator losses	417.3 K.-W. = 559.41 H. P.
Total load	5,496.5 K.-W.
I. H. P.	7,365.3 H. P.
Revs. per minute	75.02
Steam pressure	175.18 lbs.
R. H. receiver	19.1 "
L. H. receiver	19.27 "
Vacuum	(actual) 26.02 "
Temperature, injection water	42.36 deg.
Temperature, R. H. discharge	74.05 "
Temperature L. H. discharge	77.38 "
Barometer	30.50 lbs.
Water per hour	89.906 "
Drips per hour	512 "
Leakage per hour (boiler)	1.470 "
Boiler level correction	60 "
Net water per hour	87.864 "
Quality of steam	100.28%
Dry steam per hour	88.110 lbs.
Dry steam per K.-W. hour	17.34 "
Dry steam per I. H. P.	11.96 "

The final results allow for boiler leakage which was determined by a separate test of 24 hr. duration. The steam was very slightly superheated during the test, as being easier to make allowance for than wet steam, and a correction was made to reduce the superheated steam to equivalent dry saturated steam.

The vacuum was carried at 26.02 in., or as near the contract requirement as possible, but the barometer stood at 30.50 in.

Interborough Rapid Transit Company Test of Subway Engines.

An interesting official 15-hour test of one of the nine twin vertical-horizontal Reynolds Corliss engines, cylinders 42 in. and 86 in. x 60 in., which are in operation at the 59th street station of the Interborough Rapid Transit Company, New York, was concluded December 15th. The tests were conducted by the Interborough Rapid Transit Company and representatives of the Allis-Chalmers Company as a final determination of the fulfillment of the builder's guarantee and formally provided for in the original contracts.

How well the tests of engine No. 8, which was selected as representing all the engines installed, fulfilled the claims made for it, may be readily ascertained from the following data giving a synopsis of the completed tests. As per agreement, on account of the impossibility of keeping a constant load, the power was determined by the readings of tested integrating wattmeters. These readings were reduced to I.H.P. by running the generator as a synchronous motor; adding the electrical input to the switchboard readings when developing power, to obtain the power exerted by the engine. The result of the test so made, under conditions approximating the contract requirements of 7,500 h.p., 75 r.p.m., 175 lbs. steam pressure and 26-in. vacuum, was a consumption of 11.96 lbs. of dry saturated steam per I.H.P. hr., or well within the guarantee of 12.25 lbs. The steam consumption per k.w. hr. at the switchboard was 17.34 lbs. The details of the test are

The vacuum was, therefore, equivalent to only 25.52 in. referred to 30 in. barometer; no correction was made, however, as none was provided for in the contract. Other tests at varying vacua show that if the vacuum had been carried enough higher to correspond to 26 in. vacuum when referred to 30 in. barometer, the steam consumption would have been about 0.09 lbs. better, or 11.87 lbs. per i.h.p. hr., instead of the official figure of 11.96 lbs.

General Electric Straight-Air Brake Equipment.

The General Electric Company has recently placed upon the market a complete line of air-brake equipments for all classes of electric railway service. The apparatus now offered is the result of a long experience and careful study of the requirements of electric traction service. It combines the essential features of positive control, simplicity and ease of manipulation, and is adapted for motor cars, operating singly or occasionally hauling one or two trailers. The General Electric standard straight-air-brake equipment consists of the following: Motor compressor, suspension cradle, air compressor governor, motorman's valves with removable handles, brake cylinder, reservoir with hangers and drain cocks, safety valve, gages and exhaust mufflers.

The compressor is compact and self-contained and the motor is made in accordance with the standard practice of the General

operates a pair of contact fingers through a double system of levers. These open and close the circuit in response to the variation in pressure upon the diaphragm. The double series of levers renders the action of the fingers quick-break and positive, and a strong magnetic blow-out effectually extinguishes the arc formed on opening the circuit. All parts of this governor, subject to wear, are easily renewable, and the construction, together with the absence of valves of any sort, insures reliability of action.

To control the admission of air into the brake cylinder an improved form of motorman's valve is employed. These valves have been specially designed to meet the requirements of the hard service and rough usage to which they are put. Two forms are made, known as Type S and Type SS, the latter differing in construction from the first only in that it has an auxiliary valve for admitting air to pneumatic sanders. This auxiliary valve is operated by a press-button located in the handle so that the operator can apply the sand during breaking or running without removing his hand from the handle. As these valves, from the nature of their service, are subjected to wear, special attention has been paid to the wearing surfaces which are designed to keep in proper alignment and to facilitate even wear, and also to permit regrinding them when that becomes necessary. These motorman's valves are furnished either of the slide valve or rotary type.

The brake cylinders supplied with these equipments have been

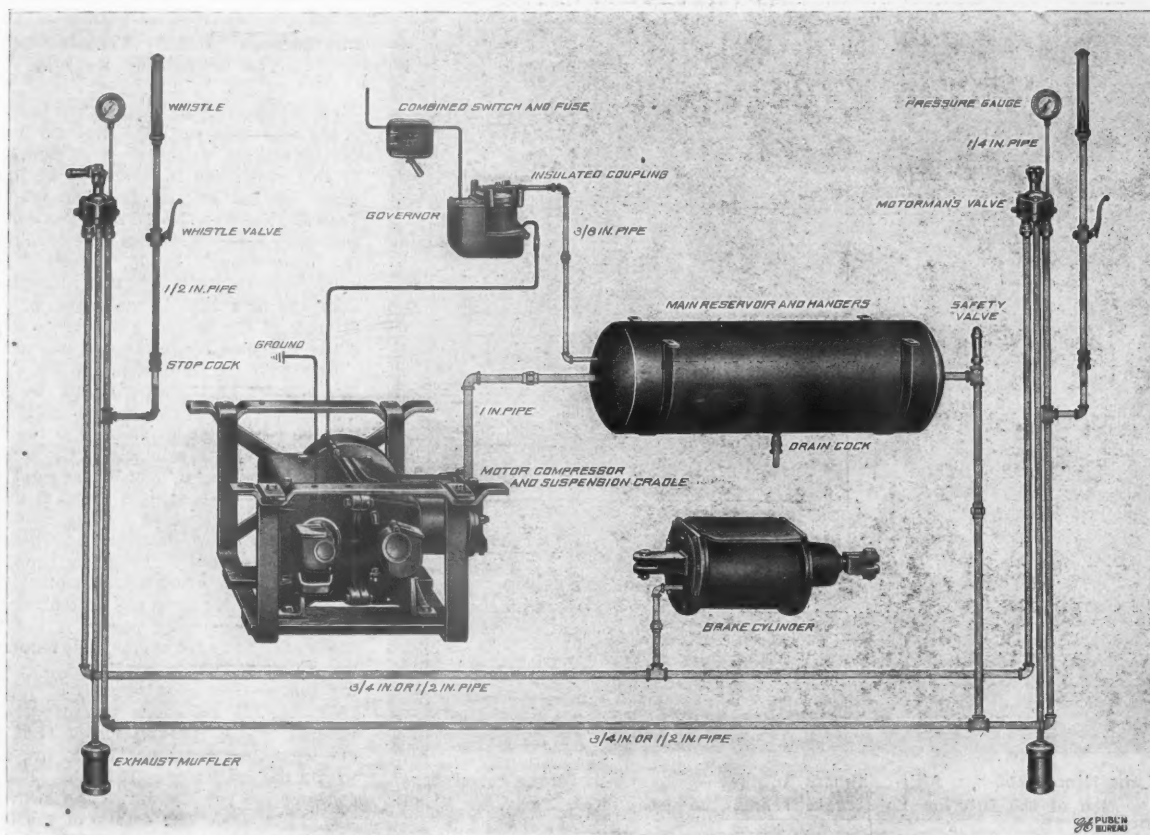


Diagram of General Electric Straight-Air Brake Equipments.

Electric Company in railroad motor construction. The four-pole cast-steel magnet frame extends in both directions to form a complete box shaped covering for the armature and field coils. All bearings are supplied with dust-proof doors providing perfect protection from dust, and at the same time rendering all parts accessible for inspection. Herring-bone gearing with a removable protecting case is provided, assuring comparatively noiseless operation and long wear. The wearing qualities of the compressor are further assured by straining all entering air through curled-hair filters, thus excluding dust and other foreign substances. All parts of the motors and compressors of the same size are interchangeable. Careful provision has been made for the lubrication of bearings, and the enclosed construction affords protection from water and dust. The compressor is supported in a cradle in any convenient place beneath the car. Several sizes of compressors are made to meet any requirements.

To govern the intermittent action of this motor compressor, a compact and reliable governor is furnished. This may be located in any convenient place beneath the car or within the car itself, as it is dust, snow and waterproof and is also of small size. This governor consists of a flexible diaphragm and plunger which

designed with a view of incorporating such features as have been found to be most satisfactory in the past. The cylinders are fitted with tubular piston rods, which surround the push rods to which the brake levers are connected. These push rods are so arranged as to move within the hollow piston rods when the brakes are applied by hand. The reservoirs are made of a special grade of steel, and are so constructed as to give maximum strength with minimum weight. A 1/2-in. drain cock of substantial construction is furnished with each reservoir; this is fitted with a lever handle. Mufflers are provided to deaden the noise of the exhaust when brakes are released. These do not interfere in any way with the free release of the brakes.

In addition to the parts mentioned, when two or more motor cars are equipped with the straight-air brake equipment, couplings for reservoir lines between cars are provided, as well as special governors for simultaneous starting and stopping of the car compressors. These retain the same desirable features as the governor described.

The General Electric Company also furnishes automatic equipments and combined straight and automatic air-brake equipment to meet the requirements of all classes of service.

GENERAL NEWS SECTION

NOTES.

The Cleveland, Akron & Columbus is to put telephones in use on one of its telegraph wires between Columbus and Akron, 131 miles.

The Maine Central has increased the wages of a large number of employees, evidently taking the same action as that reported on the Boston & Maine, the parent of the Maine Central, last week.

Press despatches from Chicago say that the Wabash has made a rate of 23 cents on grain from the Missouri river to the Atlantic seaboard, and that the Grand Trunk and the Erie will make the same rate.

A press despatch from Omaha says that all of the mail cars on the Union and Southern Pacific lines are to be equipped with electric lights, current to be furnished by dynamos connected with the axles of the cars.

The New York Passenger and Freight Agency of the London & North-Western has moved uptown about fourteen blocks; that is to say, from 852 Broadway to 287 Fifth avenue. Mr. Wand, the General Agent, announces that his new quarters are much larger and better than the old.

The Buffalo, Rochester & Pittsburg and the Grand Trunk are going to establish a car-ferry between Port Hope and Charlotte, N. Y. A company with a capital of \$500,000 has been formed to operate this ferry. The first steamer will be built to carry 25 freight cars, and it is expected to be in operation by July of this year.

The Chamber of Commerce of Norfolk Virginia, has asked the legislature of that state to empower the Corporation Commission to permit perishable freight to be moved on Sunday. This move is taken in consequence of the presentation in the legislature of a bill seeking to prohibit the movement of any kind of freight on the railroads of the state on Sunday.

According to New York City papers, a towerman at a junction on the elevated railroad in Brooklyn, N. Y., was recently incapacitated by epilepsy twice in the same day. After being revived by a physician at one o'clock in the afternoon the man continued at his post and was again stricken at 7 p. m., causing serious delays to the very heavy traffic of the line.

The Illinois Central now has in service about 3,000 refrigerator cars of its own, 500 new ones having just been built. The company carries northward from the Gulf of Mexico about 18,000 cars of bananas yearly; from Omaha 3,000 cars of oranges, and northward from the Ohio river 3,000 cars of berries and vegetables; and it carries about 8,000 cars of fruit and vegetables in various directions from other territories.

The Middle division of the Pennsylvania Railroad has again broken its freight train record, moving past Mifflin in the month of January 193,929 cars, which is equal to an average of 6,256 cars a day, or a train about 45 miles long. Assuming that the westbound and eastbound movements are equal in length, this means 22½ miles of cars moved each way, or nearly a mile of cars each hour. This division is a four-track road for the larger part of its length.

The Chairman of the Committee on Territories in the Lower House of Congress has introduced a bill to change the method of taxing railroads in Arizona and New Mexico. It provides that, beginning next year, such property must be taxed in the same way as other property. At present, it is claimed that the railroads pay less than their share, and that in consequence of the easy tax conditions the railroads are opposing the bills now before Congress to convert these two territories into a state.

A shipment of books belonging to the United States government, valued at \$1,000, was spoiled in the flood at Kansas City in 1903, and, according to a press dispatch from Washington, the Missouri Pacific Railway, in whose charge the freight was at the time, asked to be relieved from responsibility on the ground that the damage was due to an act of God; but the treasury department insists that the railroad shall pay the damage, because the books were allowed to go unattended to for about a month after flood had subsided.

Mr. K. L. Martin, the Engineer of New York City, in charge of Brooklyn Bridge, reports that by improving the supervision over the trolley (surface) cars running over the bridge, the number of cars per hour has been increased from 285 to 305. The average time of a trip across the bridge has been reduced from 18 minutes to 12 minutes. Inspectors watch the progress of the cars across

the bridge and also take charge of the loading, unloading and management of the cars at the loop terminus on the Manhattan side.

The Canadian Pacific has decided to make Quebec the terminus for the present of the new fast steamers of its Atlantic fleet. The company feels that the danger and risk involved in bringing the "Empress of Britain" and "Empress of Ireland" up to Montreal would be so great that it does not feel justified in assuming the responsibility. The President of the company says that there is no port in the Dominion of Canada which has proper facilities for ships of such size as these, and that it will take some months to prepare even temporary terminals at Quebec.

From a Chicago paper we learn that the President of the Chicago, Burlington & Quincy has received a protest from a cheese manufacturer, who says that his sales of cheese to saloonkeepers, who furnish liberal free lunches with drinks have been seriously diminished by the action of the road in forbidding its employees to patronize saloons. According to the veracious reporter's version, the freight department of the Burlington is liable to lose heavy and profitable shipments of cheese unless the paternalistic operating department stops taking such an active interest in what the employees do when off duty.

The passage of a two-cent fare bill by the legislature of Ohio is regarded as now assured, and the committees in charge of transportation matters are proposing to report other measures; one to make the giving or acceptance of a pass about the same as bribery and subject to the same penalties; one to require the carrying of 150 lbs. of baggage with every passenger; one to require at least two passenger trains each way daily on every railroad; one to require sign posts at every highway crossing, and one to require all farm crossings to be better protected by fences and cattle guards.

The employees of the Pennsylvania Railroad at the Greenville (N. J.) freight terminal have formed a mutual benefit association for the purpose of supporting members when they are sick or disabled. The plan is to provide a benefit of \$10 a week, which is said to be the rate paid by a similar association of the company's employees at Trenton, N. J. Most of these railroad men are presumably members of the volunteer relief department, which is managed under the care of the railroad company, but this department pays only 40 cents a day to sick members and 50 cents to those disabled by accidents, sums which many of the men believe to be smaller than they ought to be.

The railroad committee of the Massachusetts Legislature this week considered the proposition of E. Alden Dyer, a member of the House from Whitman, Plymouth County, that all passenger cars shall be equipped with chemical fire extinguishers of a kind to be approved by the railroad commissioners, with a penalty of from \$100 to \$1,000 for violation of the law. Mr. Dyer is a physician and he argued that the horrors of fires in railroad accidents had made it clear that if chemical fire extinguishers were at hand it was probable that lives would be saved. The only speaker in reply was Woodward Hudson, counsel for the Boston & Albany, who argued that the proposition was impracticable. If the apparatus were provided, it would be liable to be destroyed by the collision which wrecked the cars, and, if not, it would not be adequate for the occasion when a furious fire is raging.

The Cape to Cairo Railroad.

Sir Charles Metcalfe, Consulting Engineer of a number of African railroads, who has just returned to England after a journey from the Zambesi to the Congo Free State border, said in an interview discussing the progress of the Cape to Cairo railroad: "A fortnight ago the rails reached the Kafue river, 260 miles beyond Victoria Falls, and at this point a bridge 1,600 ft. long is being built to cross the stream. Beyond the Kafue, grading is nearly finished for 70 miles more, so that we hope that the line will reach the Broken Hill zinc and lead mines by June. There will then be continuous communication from Cape Town to a point 374 miles north of the Zambesi. The line is progressing at the rate of one mile a day. While nothing has yet been definitely decided as to further extension, it is probable that the next section of the line will go from Broken Hill due north to Bwone Macubwa, a point on the Congo border and the center of a rich copper area in north-west Rhodesia.—*London Times*, Jan. 20, 1906.

Isn't This Oppression?

The Interstate Commerce Commission in the case of W. Scheidel & Co. against the Chicago & North-Western and the Union Pacific, in an opinion by Commissioner Prouty has decided against Scheidel. It appears that the "Scheidel outfit" is an electrical apparatus consisting of a Ruhmkorff coil, an interrupter, a small rheostat and

two switches, fitted to a strong table. The parts are detachable and are shipped in separate boxed packages, except the table, which is crated. This outfit, which transforms an electrical current of low voltage into one of extremely high voltage, is used in medical and scientific work, including the use of the X-ray, and also in wireless telegraphy and chemical works. The western classification places X-ray apparatus and scientific or medical instruments in double first class, and electrical apparatus, not otherwise specified, in first class. The complainant contended that its outfit should be treated as an ordinary electrical appliance and carried at first class rates. The decision of the Commission is that under the conditions now governing the manufacture and use of complainant's outfit, that outfit is properly classified by the carriers with the X-ray and medical or scientific apparatus as double first class, and is not entitled to a first class rating with dynamos, transformers and other electrical machinery; but no opinion is expressed upon the justice of the first class rates for such machinery.

Railroad Courses at New York University.

The School of Commerce, Accounts and Finance, of New York University, announces several new railroad courses for the second term of the current year, beginning February 5. These include: Railroad accounting, conducted by Mr. M. P. Blauvelt, Comptroller of the Erie Railroad, and Mr. C. E. Forsdick, of Haskins & Sells, certified public accountants; Legal problems of railroad operation, by Roberts Walker, LL.B., Assistant to the General Counsel of the Chicago, Rock Island & Pacific; Principles of American rate making, and Rate problems, by W. H. Lough, Jr., A. M.; Railroad finance, by T. W. Mitchell, Ph.D., and Industrial geography, by W. C. Webster, Ph.D.

New Railroads Planned for South America.

Consular Reports show that many new short railroads are projected in South America, some of which are as follows:

ARGENTINE.

The Argentine Government has decided, says the French Bulletin of Buenos Ayres, on the construction of railroads between the following points: Villa Mercedes and Rosario, Cordoba and Rio Cuarto, Holmberg and Dolores, Dean Funes and Rosario, with a

Paz Railroad will be in a stronger position to compete with trade routes via the River Plate and South Atlantic.

URUGUAY.

The British chargé at Montevideo reports that an agreement has been made by the Uruguayan Central Railroad and the Government for the extension to Centurion, a place on the River Yaguaron, forming the boundary of Uruguay and Brazil, of the road terminating at Nico Perez, Province of Minas. Also for a branch line to Treinta y Tres. The length of the lines will be from 250 to 300 miles, to be completed in three years at an expenditure of \$7,500,000 gold.

PARAGUAY.

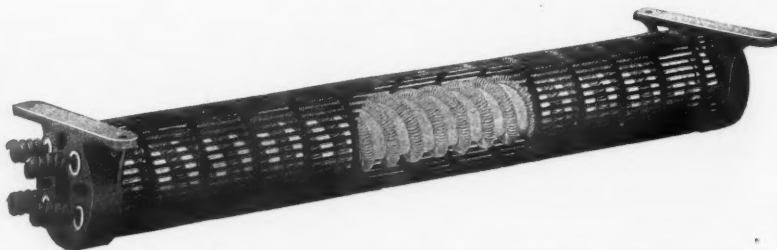
The Paraguayan Government intends building a meter gage railroad from a point on the River Paraguay near San Pedro, through rich forest lands and through the yerba-maté district, with the intention of ultimately extending to the frontier of the Brazilian State of Matto Grosso.

The Manila & Dagupan.

The branch of this road from Bigaa, on the main line, north to Cabanatuan, 45 miles, was officially opened last month, it having been completed on December 18. The franchise for this branch was granted in 1903, and it has been built without government aid. It is narrow gage, like the main line; 66-lb. rails are used, and there are 2,200 hardwood ties to the mile. There are 22 masonry culverts, 266 pile bridges and 41 steel bridges. The maximum grade is 2 per cent., and the maximum curvature is 4½ degrees. The Manila & Dagupan, 120 miles long, was the only steam road in the Philippines when the Americans took possession. The road and rolling stock were almost entirely destroyed during the insurrection of 1899, but the line was soon put in shape, and during the next year its earnings were nearly as high as they had been under Spanish rule. Since then they have increased rapidly, and in 1903 both gross and net earnings amounted to more than twice the figures for 1898.

Electric Heaters for New York Central Suburban Cars.

The New York Central has just contracted with the Consolidated Car Heating Company, New York, for furnishing electric heaters for 180 steel cars for its suburban service. The accom-



Consolidated Car Heating Co.'s Truss-Plank Heater. Consolidated Car Heating Co.'s New Type Double-Coil Cross-Seat Heater.

branch line to Villa Maria, Barranquera, and Tintina, via Otumpa, Formosa, and Embarcación, Soto and Dolores, San Juan and Jachal. These lines will form part of the state railroad system. The Argentine Congress has sanctioned the following concessions: To Señor Santiago J. Duhalde for a railroad from Ruñó (Santa Fé Province) to Catrilló (Pampa Central), and to Señores Tagliani for a railroad from Mar del Plata to Azul via Tandil.

CHILE.

The German consul at Valparaiso reports the following concessions for railroads in Chile: Mauro Lacalle, Valparaiso, between the saltpeter works, Pepita, and Castilla. Eduardo Caballero and the Progreso Saltpeter Company, Antofagasta, for a line from kilometer 133 of the Antofagasta-Bolivia Railroad to Ansonia Saltpeter Works. The Compañía Commercial y Ganadera Chile-Argentina, Valparaiso, for a suspension railroad, about four miles long, from Casa Pangne to the Argentine frontier. The Valparaiso Saltpeter Company, for a line five miles long, from the Aguas-Blancas-Caleta-Coloso Railroad to La Valparaiso Saltpeter Works. The Leonor Saltpeter Company, Santiago, to their works from the Antofagasta-Bolivia Railroad.

BOLIVIA.

The British chargé at Buenos Aires reports that an Argentine syndicate has obtained a concession from Bolivia to construct a railroad of one-meter gage from Santa Cruz eastward to Pedro Suarez, where a port is to be made on the Bolivian side of the River Paraguay, opposite Corumba, Brazil. The line would be 385 miles long, entirely in Bolivian territory. The Bolivian and the Argentine governments are negotiating for a connection in Bolivia, from Potosí, with the Argentine Central Northern Railroad, a Government line which is being built northward from Jujuy to the Bolivian frontier. This will offset to some extent the new line from Arica to La Paz, which will give Bolivia a direct outlet westward to the Pacific coast. When the Panama Canal is completed, the Arica-La

panying illustration shows a new type of double coil cross-seat heater for use under the cross seats. It has a single porcelain spindle with a double groove, and all lead wires are carried out of the heater case at one end. The truss-plank heater, which is also illustrated herewith, is to be used for saloons and motormen's cabs, one for each saloon and two for each cab. Each car will be fitted with 30 cross-seat and six truss-plank heaters, and in the coils of one car equipment 4,212 ft. of wire will be used, or 144 miles of wire in the 180 equipments. The heaters will be arranged for 4 deg. of heat. The Consolidated Car-Heating Company reports sales of 51,815 electric heaters for use in 4,259 cars during the year 1905.

Crops in the Canadian Northwest.

The *Wall Street Journal* reports that there have already been shipped out this season from the Canadian Northwest more than 62,000,000 bushels of grain. Canadian Pacific figures show 46,163,000 bushels of wheat and 2,771,000 bushels of other grain received compared with only 21,523,000 bushels of wheat and 1,014,000 bushels of other grain received in the corresponding period last season. The Canadian Northern figures are 12,350,000 bushels of wheat and 750,000 bushels of other grain. This gives 58,513,000 wheat and 3,521,000 other grain or 62,034,000 in all. The seed and bread requirements of the country are at least 17,000,000 bushels, so that already 75,000,000 bushels of the last crop may be figured upon as having come into sight. Minneapolis grain firms, who maintain branch offices in Winnipeg, say that there are from 12,000,000 to 15,000,000 bushels of wheat yet in the hands of Canadian farmers unsold. The quantity in store at terminal elevators on Lake Superior is a little over 4,550,000 bushels. The region produced a magnificent crop of oats last year, but receipts at terminal points have not been as large as grain men had expected from the crop promise. This is due in part to the immensity of the work of new development in the country, and the heavy railroad construction.

It is believed that during the coming summer so many horses will be sent into the interior for work that the consumption of oats will be still more largely increased.

Railroads and the Weather.

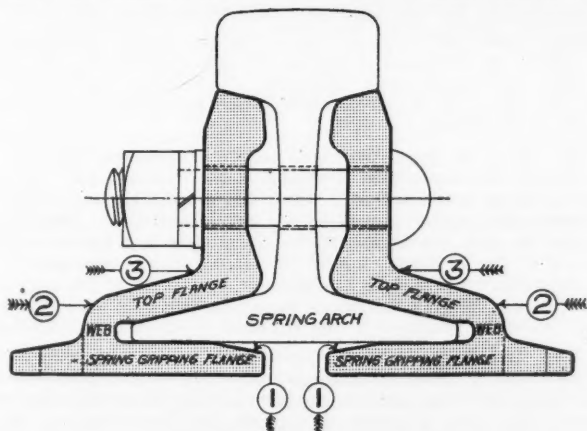
According to the *Wall Street Journal* the railroads of the northern states and Canada made record earnings during the month of December. The weather has not been so mild in the territory of these roads in years as in December and January of the current fiscal year. Not all roads have reported their monthly earnings for the full December as yet, but some have published weekly gross earnings. In every instance in the case of the northern roads there has been shown a substantial advance. The increase as indicated by the weekly earnings of such of these roads as made weekly reports is shown in the following table, which gives the total of gross earnings for the month of December, compared with the gross earnings of December, 1904:

Railroads.	Gross		Increase.
	1905.	1904.	
Canadian Pacific	\$5,568,000	\$4,517,000	\$1,051,000
Great Northern	4,357,842	3,710,297	647,545
Canadian Northern	437,800	384,600	53,200
Duluth, S. S. & Atlantic	213,548	191,913	21,635
Grand Trunk	3,401,472	3,185,857	215,615
M. St. Paul & S. S. M.	931,749	700,586	231,163
Northern Pacific	5,110,632	4,362,637	747,995
New York Central	7,746,083	6,893,934	852,149

The uniformity of the increases and their size tells the story. Every road which is specially affected by the bad weather during the winter has an increase to show. This is due partly to the magnificent business of the country at large, but it is also true that the weather has been the most important factor affecting earnings. It will be noticed that there are different kinds of roads included in the table. The bulk are western roads, but the great increase scored by the New York Central indicates what the trunk lines as a whole are doing. It is quite characteristic. The list does not confine itself either to great or small roads, and all show similar results. The effect of the weather during the month of January will be more marked when the returns are complete than is the exhibit for December, if conditions continue favorable until the end of the month. The earnings for the second week of January are the largest since June, 1903, when the increase of gross earnings for the week over the corresponding week of 1902 was equal to 23.38 per cent. The total gross earnings of 25 roads for the second week of January were \$6,644,513. This was an increase over the second week of 1905 of \$1,193,945, or 21.9 per cent. While the gross earnings results are remarkable owing to the fact that the roads have been able to handle a larger traffic, it is to be expected that the net earnings will show larger proportionate gains for December, and for January, also, if the fair weather holds.

The Stanford Rail Joint.

The rail joint illustrated herewith was designed and patented by Mr. Arthur L. Stanford, Chicago, who describes the device substantially as follows: Railroad men know the great advantage of forming the standard angle bar to have no contact with the web



The Stanford Rail Joint.

of the rail. This reduces vibration and consequent wear, and increases the holding power. The rail joint shown herewith secures these results by so forming the splice bars that they have no contact with the base of the rail over more than half its width. The bottom flange of both splice bars is beveled at 1 as shown in the drawing. This deprives the rail base of any central support and converts it into a spring arch, also converting the bottom flange of each splice bar into a spring-gripping flange. The result is a resilient rail joint which will greatly reduce lamination of rails, cutting by rail base into joint ties, noise, and destruction of rolling stock.

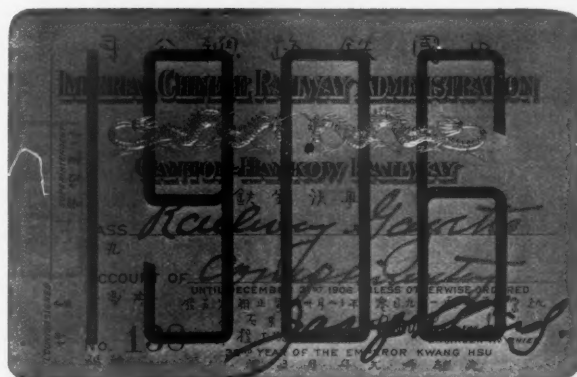
The Stanford joint comprises two rail joints in one. Above 2

in the drawing is the standard angle bar. Below 3 is another powerful rail joint. Both the bottom flanges being beveled at 1, as already mentioned, become gripping levers, and each, together with the top flange and connecting web, constitutes a friction clutch, which becomes operative by the weight of the train and support of joint ties, to grip the base flanges of the rails. The splice bars are thus in great measure unified with the rails themselves, the joint is greatly strengthened, and accurate alignment of rails, both vertical and lateral, is secured.

The standard angle-bar joint has only about one-third the vertical strength of the rail. The Stanford joint has equal vertical and lateral strength with the rail itself, showing neither more nor less deflection than the rail, and giving, therefore, a close approximation to a continuous rail. The two halves of the joint are duplicates. Mr. Stanford's office is in the Railway Exchange.

Still a Few Left.

We have received an annual, sent us in defiance of the Interstate Commerce Commission, President Roosevelt, the trunk lines and other



We Are Not Without Honor Save in Our Own Country.

foes of this kind of a rebate. The annual is an instance of wicked favoritism, nothing less; but we show it herewith by way of asking well-informed travelers if they can advise us how we can use this pass without first having some other passes.

British Locomotive Engineering in 1905.

While the year 1905 was productive of many interesting developments in locomotive engineering in England, it also shows that in the majority of cases designers still favor the employment of simple rather than compound locomotives. In the development that has taken place it has been brought about that types of engines considered novel for British railroads as recently as 1900 have now become commonplace enough, not only on one, but on several lines. Thus in standard passenger locomotive design we have the Atlantic (4-4-2) and 4-6-0 wheel arrangements, while on nearly all of the principal systems we may find eight-wheels-coupled goods engines. On two railroads, i.e., the Great Western and London & North-Western, Consolidation or 2-8-0 type locomotives are employed, and the first named company also has a large stock of Mogul (2-6-0) type engines in freight service. The 2-6-2 and 4-6-2 passenger types and ten-wheels-coupled goods locomotives (with and without extra wheels) such as are freely used in the United States are as yet untried in this country.

Mr. Ivatt's compound on the Great Northern presents something of a novelty in its cylinder arrangement. In this engine the four cylinders, viz., two high and two low-pressure, are carried in line at the bogie center, two (the high-pressure) being outside the frames, while the low-pressure are between them below the smoke-box. So far as the actual disposition of the cylinders themselves goes, there is nothing new in this, of course; but it is the only locomotive yet built with four cylinders arranged in transverse alignment to drive separate axles. This plan has undoubted advantages, especially where the wheel arrangement is extended to the Atlantic and 4-6-0 types. It permits of a restricted length of wheel-base while employing the separate axle method of driving. Thus Mr. Ivatt has succeeded in keeping the total wheel-base of his engine down to 26 ft. 4 in., which is very short for an Atlantic type locomotive with 6-ft. 8-in. diameter drivers; indeed, it is the shortest wheel-base of any 4-4-2 type engine in Great Britain, simple or compound.

On the London & South-Western Railway, Mr. Dugald Drummond, Chief Mechanical Engineer, has introduced an entirely new type of locomotive for working fast and heavy passenger traffic. In the engines of this series, four single-expansion cylinders and three pairs of coupled wheels are employed. This combination of cylinders and wheels is entirely new on British railroads. In it, the cylinder capacity is unusually large, as is also the boiler. There has been a constantly greater disposition to adopt Walschaert valve

gear. New locomotives on the Great Northern, London & South-Western and Great Western have been fitted with this gear; in each case the engines have four cylinders.

The boilers have been getting larger and larger during the past year, and any developments to be effected will shortly have to be wholly confined to improvements in detailed design rather than in seeking still further to increase the general proportions which in many cases have reached the maximum permissible under the existing loading gage restrictions.

The experiment, if such it can be called, of throwing open to competition among outside firms the designing of a locomotive for specified service on the main line of a railroad company, possessing its own locomotive engineer and workshops, was tried for the first time in modern circumstances during 1905. The Great Northern Railway Company accepted the plans for an express locomotive prepared by the Vulcan Foundry Company, Limited, of Newton-le-Willows.

On the Great Western Railway, Mr. G. J. Churchward, M. Inst. C. E., introduced a new type of tank locomotive having the 4-4-2 wheel arrangement with outside cylinders. This is an entirely new type on the railroad in question, and the engines are specially noteworthy on account of their having the largest diameter of coupled wheels of any tank engines in this or probably any other country. A new type of passenger locomotive appeared on the London & North-Western Railway. This has the 4-6-0 wheel arrangement and two inside cylinders.

The Cincinnati-Philadelphia Air-Line.

On January 25 a consignment of 150 tons of walnut logs for export was shipped to Philadelphia from Washington Court House, Ohio, in a solid train of nine cars. The shipment was routed via the Cincinnati, Hamilton & Dayton, Nickel Plate, Lehigh Valley and the Reading. It has been loaded on a steamer, which is to sail at once for Hamburg.—*Exchange*.

A Better Corn-Crop Train.

The Illinois Central is going to run a special train of six cars over 2,000 miles of its lines in Illinois, to stimulate interest in better corn crops—quantity and quality. The train will stop at 126 cities, towns, villages and crossroads stations. Each stop will be of 40 minutes duration, during which there will be a lecture on seed and soil. The tour will be in charge of Professor Hopkins of the University of Illinois, and he will be assisted by professors from agricultural schools. Representatives of the Illinois Central will accompany the train and will tell of the results in the way of increased shipments that have come from improved methods of farming. The train will leave Chicago February 20. The day lectures will be in the cars, and evenings, halls, where available, will be used.

Manufacturing and Business.

The D. F. Holman Tracklayer Co., Chicago, has received an order for two tracklaying machines from the Tidewater Railway.

The Enterprise Railway Equipment Co., Chicago, has an order for 4,000 cast-steel bolsters for cars recently ordered by the Wabash.

Richard D. Jackson, Jr., 96 Warren street, New York, has been appointed as New York representative of the Keystone Lubricating Co., Philadelphia, Pa.

The McClintic-Marshall Construction Company has opened an office in the Missouri Trust Building, St. Louis, Mo., in charge of G. I. Finley, Contracting Engineer.

G. H. Hutchinson, who recently resigned as Road Foreman of Engines on the Central of New Jersey, is now with the locomotive department of Norman B. Livermore & Co., San Francisco, Cal.

H. M. Cryder, formerly Principal Assistant Engineer of the Wabash, has been appointed Manager, in charge of the Western district, of the Wm. P. Carmichael Co., Engineer and Contractor, of St. Louis.

Wilbur H. Traver, formerly manager of the Railroad Department of the Ingersoll-Rand Company, with headquarters in Chicago, is now with the Chicago Pneumatic Tool Co. as manager of its Mining and Contract Department.

The Westinghouse Electric & Mfg. Company has received an order from the United Railways & Electric Company, Baltimore, for 100 No. 101-B four-motor equipments complete with all details. This is in addition to a recent order for 200 motors of the same type.

The Railway Appliances Company announces having taken the sales agency for the "elastic nut" made by the National Elastic Nut Co., Milwaukee, Wis. All inquiries in regard to price, etc., should be addressed to the former at 1175 Old Colony Building, Chicago, or 114 Liberty street, New York.

A. B. Newell, for the past five years Vice-President and General Manager of the White Pass & Yukon Railroad, and previous to that Superintendent of the Chicago division of the Lake Shore & Michigan Southern, has accepted a position with McCord & Com-

pany, Chicago, in charge of the manufacture and sale of the McCord draft gear.

The Western Elaterite Roofing Co., Denver, Colo., reports a good business for 1905 and an encouraging outlook for the current year. The good qualities and desirability of this roofing are evidenced by its constant use during the past ten years by many of the largest railroads and mining companies in the west. This company also makes "Elaterite" paints, for which it has a constantly increasing demand.

Sheldon E. Bent became connected with the Railway Appliances Co. Feb. 1st, in the track department. He is a railroad man of considerable acquaintance, having been located in Mexico the last six or seven years as Superintendent of Transportation of the Oceanic of Mexico and as General Superintendent of the Vera Cruz and Pacific. Previous to that he was at one time Superintendent and then Purchasing Agent of what is now a part of the Brooklyn Rapid Transit Co.

The H. W. Johns-Manville Company has recently established two new departments at its head offices in New York. One of these is the Railroad Department, devoted to railway supplies, of which the company makes a large variety. J. E. Meek has been appointed manager of this department. The other is an export department which has been organized under the management of William Angevine. This department has been organized in order to facilitate the handling of the immense foreign business of the company.

W. H. Marshall, General Manager of the Lake Shore & Michigan Southern, has been elected President of the American Locomotive Co., effective February 15. Mr. Marshall was born in 1864 and became Assistant Superintendent of Motive Power of the Chicago & North-Western in 1897. Two years later he went to the Lake Shore & Michigan Southern as Superintendent of Motive Power. He was appointed General Superintendent of that company in 1902, and later had his jurisdiction extended over the Lake Erie & Western, and the Indiana, Illinois & Iowa. In 1903 he was made General Manager of these three roads. Mr. Marshall has had much to do with designing locomotives for the Lake Shore. The Class J locomotives of the Lake Shore (2-6-2) were built from designs original with Mr. Marshall. He was also one of the first, if not the first, to use 19-ft. tubes. As an executive officer Mr. Marshall displayed the same ability that he had shown in the motive power department of the Lake Shore; and, in fact, his ability was well recognized before he became Superintendent of Motive Power.



W. H. Marshall.

Mr. Henry M. Sperry has been appointed Resident Manager of the General Railway Signal Company at New York in place of Mr. Hovey, whose promotion was noted last week, and has resigned his position as Consulting Engineer with the Hudson Companies, to take the new place. Mr. Sperry is already well-known to the readers of the *Railroad Gazette* by reason of his prominence in the signaling world and by his writings. A sketch of his life, was given in the *Railroad Gazette* of March 3, 1905. He will continue to be consulting engineer to the Kinsman Block System Company.

The Rail Joint Company, New York, is the corporate name of the company recently organized under the laws of the State of New York, which has acquired the business and property of the Continuous Rail Joint Company of America, the Weber Railway Joint Manufacturing Company and the Independent Railroad Supply Company, and it will carry on the business of the three companies substantially as it has been conducted in the past. The Board of Directors are: President, Frederick T. Fearey; Chairman of Executive Committee, George G. Frelinghuysen; Vice-Presidents, L. F. Braine and Percy Holbrook; Treasurer, F. C. Runyon; Secretary, Benjamin Wolhaupter. The other Directors are: Mark T. Cox, George A. Weber, Edward Y. Weber, Marcus L. Ward and Charles P. Wheeler. The bringing together of these several interests will, it is hoped, enable the Rail Joint Company to supply more promptly and satisfactorily the demands of the customers of the several companies, and put the new company in a position to develop any improvements that can be made in any of the several types of joints manufactured by it.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Railway Club of Pittsburgh.

At the meeting of this club to be held at the Monongahela House, February 23, a paper on reinforced concrete will be presented by Mr. R. H. Cummings.

American Society of Civil Engineers.

At the regular business meeting of this society, February 7, a paper on "Test of a Three-Stage Direct-Connect Centrifugal Pumping Unit," by Philip Harrison, was presented for discussion. This paper was printed in the *Proceedings* for December, 1905.

Iowa Railway Club.

At the recent annual meeting of this club the following officers were elected: President, W. B. Foster, Superintendent of the C. M. & St. P.; Vice-President, W. H. Gibbon, Superintendent of the C. R. I. & P.; Secretary, W. B. Harrison, of the C. G. W. A paper was also presented at this meeting on the variation in height of couplers, by J. J. Hennessey, of Milwaukee, Wis.

Canadian Society of Civil Engineers.

The first annual convention of this society was held Jan. 29-Feb. 2, at the King Edward Hotel, Toronto. Vice-President C. H. Rust presided and the address of welcome was delivered by Frank Summerville on behalf of the city of Toronto. The Council reported the present membership as 1,389, as against 1,261 in 1904. Presentations were made of the Gzowski medal awards for 1904 as follows: Five to C. B. Smith, M. E., for his paper on the construction of the Canadian Niagara Power Co.'s 100,000 h.p. hydro-electric plant, at Niagara Falls, Ont., and two in the students' class; one to F. H. Schwitzer, on mining, and one each to G. S. Cole and C. R. Young. There were no papers submitted by the electrical section. The Treasurer's report showed \$1,320 on hand. Professor Porter, Chairman of the Committee, submitted the library report, which showed that 150 new books have recently been added. The total number of volumes at present is upward of 2,000. At the evening session an interesting address on diamond mining in Kimberly, South Africa, was delivered by J. B. Porter, D.Sc. This lecture also included illustrations of the Victoria Falls, which has power equal to one-tenth of Niagara in the dry season, and more than double that of Niagara in the wet season. On Jan. 31 the members of the society visited Niagara Falls, and the power plants at that place. Visits were also made to the Electrical Developing Company's tunnel and power house. Visits were also made to the Canadian Niagara Company's power house.

H. D. Lumsden, of Ottawa, was elected President, and M. J. Butler, Ottawa; C. B. Smith, Toronto, and W. McL. Walbank, Montreal, Vice-Presidents. On February 1 papers were presented on "Hydraulic Locks on the Trent Canal," by W. J. Francis; on "Tide Levels and Datum Planes on the Pacific Coast of Canada," by Dr. W. Bell Vawson, and another on "Dam Construction," by Charles P. Baillairge. At the afternoon session resolutions were unanimously passed looking to an agreement with the Dominion Government to secure permanent records of surveys, and for the establishment of a general topographical and geodetic survey scheme for the Dominion of Canada. The retiring President, Ernest Marcean, presented a paper on the "Origin of Our Canal System." Another paper on "Toronto's Experience with Conduits" was presented by C. L. Fellowes, Assistant City Engineer of Toronto. The annual banquet was held in the evening at the King Edward Hotel, at which addresses were made by the Hon. Mr. Emerson, Minister of Railways; Mr. Francis, City Engineer, and others. On February 2, visits were made to points of interest in the city of Toronto, under the auspices of the Toronto Engineers Club.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Erie.—G. N. Orcutt has been appointed General Claims Attorney, with office at New York City, succeeding O. F. Georgi.

Rock Island Company.—W. B. Leeds has resigned as Chairman of the Board, member of the finance committee and director.

Western Pacific.—The general offices of this company are at the Safe Deposit Building, San Francisco, Cal.

Operating Officers.

Chicago, Burlington & Quincy.—W. G. Sharretts, Superintendent at Burlington, Iowa, has resigned.

Chicago, Rock Island & Pacific.—A. E. Sweet, heretofore General Manager of the Arkansas Southern, has been appointed Assistant to the Second Vice-President of the C. R. I. & P. J. B. Smalley, Superintendent at Herrington, Kan., has been appointed Superintendent of the Illinois division, with office at Rock Island, Ill., succeeding L. B. Allen, resigned. T. H.

Beacom, Superintendent at St. Louis, Mo., succeeds Mr. Smalley. J. F. Sugrue, Trainmaster at Little Rock, Ark., succeeds Mr. Beacom.

Chicago & North-Western.—W. D. Cantillon, who was recently ap-



W. D. Cantillon.

pointed Assistant General Manager, was born in 1861. His first railroad service was in 1878 as a brakeman on the Chicago & North-Western, and he has been on that road ever since. He was made trainmaster at Milwaukee in 1891, and Assistant Superintendent at that place in 1893. Four years later he was appointed Superintendent at Winona, Minn., and in 1901 he was promoted to be General Superintendent, which position he held at the time of his recent appointment.

W. E. Morse, who succeeds Mr. Cantillon as General Superin-

tendent, was born in 1864, and graduated from Wayland University. His first railroad service was on the Chicago & North-Western in 1881 as telegraph operator. He was made agent next year and chief train dispatcher in 1883. After five years he was appointed Trainmaster and was promoted to be Assistant Superintendent in 1891. In 1898 he was made Division Superintendent at Chicago, where he remained for five years. He then went to the Chicago, Rock Island & Pacific as General Superintendent of Construction, at St. Louis, but returned to the Chicago & North-Western in February, 1905, as Superintendent of the Madison division, which position he left on Jan. 24 of this year to become General Superintendent.



W. E. Morse.

Denver, Enid & Gulf.—M. Worthington, Car Accountant, has been appointed General Superintendent, with office at Enid, Okla. T.

Lake Shore & Michigan Southern.—W. H. Marshall, General Manager, has resigned to become President of the American Locomotive Co., effective February 15. E. A. Handy, Assistant General Manager, succeeds Mr. Marshall.

New York, Chicago & St. Louis.—A. W. Johnston, General Superintendent, has been appointed General Manager, and the office of General Superintendent has been abolished.

Traffic Officers.

Chicago, Rock Island & Pacific.—T. H. Simmons, Assistant General Freight Agent at Chicago, has been appointed General Freight Agent of the lines east of the Missouri river, with office at Chicago.

Des Moines, Iowa Falls & Northern.—S. L. Strauss has been appointed General Freight and Passenger Agent, with office at Des Moines, Iowa, succeeding R. H. Belding.

Southern Pacific-Atlantic System.—H. A. Jones, hitherto Traffic Manager of the Galveston, Harrisburg & San Antonio, has been promoted to be Passenger Traffic Manager of the Atlantic System. T. J. Anderson, General Passenger Agent of the Texas & New Orleans, has been appointed General Passenger Agent of the G., H. & S. A. Joseph Hellen, Assistant General Passenger Agent of the Texas & New Orleans, has been appointed General Passenger Agent, succeeding T. J. Anderson.

Engineering and Rolling Stock Officers.

Cleveland, Cincinnati, Chicago & St. Louis.—G. G. Davis has been appointed General Foreman of the Car Department, with office at Indianapolis, Ind.

Halifax & Southwestern.—L. H. Wheaton, who was recently appointed Chief Engineer of this road, entered railroad service in 1885 in the department of railways and canals, serving successively until June, 1890, as instrument man, Resident Engineer, and Division Engineer. In 1890 he was appointed Chief Engineer of the Phillips & Rangeley, later becoming Superintendent. In 1892 and 1893 he was Chief Engineer in charge of construction of the Laurel River & Hot Springs, and then became Chief Engineer of the Coast Railway, of Nova Scotia, becoming also General Superintendent of that road in 1897. In 1901 he was appointed Locating Engineer on the Halifax & Southwestern, later being made Division Engineer, which position he held until his recent appointment.

Illinois Central.—L. E. Hassner, General Foreman at East St. Louis, has been appointed Master Mechanic at Clinton, Ill., succeeding M. J. McGraw, resigned.

Lehigh Valley.—L. L. Bentley, Mechanical Engineer, has resigned to become Vice-President and General Manager of the Oswego Boiler & Engine Co., Oswego, N. Y.

Pennsylvania.—G. W. Strattan, Master Mechanic at Altoona, Pa., has been retired on a pension, being 70 years old. I. B. Thomas, Master Mechanic at Pittsburg, succeeds Mr. Strattan. W. B. Elmer, Jr., Assistant Engineer of Motive Power at Altoona, succeeds Mr. Thomas.

Pere Marquette.—J. F. Deimling, Division Engineer at Grand Rapids, Mich., has been appointed Chief Engineer, with office at Detroit, Mich., succeeding F. H. Alfred. W. J. Long succeeds Mr. Deimling at Grand Rapids. J. Tuthill, Bridge Engineer, has been appointed Engineer of Bridges and Buildings, with office at Detroit.

Philadelphia & Reading.—H. J. Beck, Road Foreman of Engines at Reading, Pa., has been appointed to the new office of General Locomotive Inspector, with office at Reading.

Wabash.—E. K. Woodward, Engineer of Maintenance at Peru, Ind., has been appointed Principal Assistant Engineer, with office at St. Louis, succeeding H. M. Cryder, resigned.

Purchasing Agents.

Colorado & Southern.—F. S. McNamara, Purchasing Agent, has resigned.

LOCOMOTIVE BUILDING.

The Norfolk & Western has ordered 75 locomotives from the American Locomotive Co.

The Chicago Heights Terminal Transfer is having two locomotives rebuilt by F. M. Hicks & Co.

The Mexican Central, it is reported, has ordered 20 locomotives from the American Locomotive Co.

The Wabash, it is reported, has ordered 60 locomotives from the Baldwin Works, for delivery during the current year.

The Minneapolis, St. Paul & Sault Ste. Marie is considering the purchase of 25 locomotives. The details have as yet not been decided upon.

The Central Vermont, it is reported, has ordered 14 locomotives. Ten of these will be compound consolidation freight engines, and the remaining four will be for passenger service.

The Kansas City Southern, as reported in our issue of January 26, has ordered 15 simple consolidation (2-8-0) locomotives from the American Locomotive Co., for July, 1906, delivery. These engines weigh 200,000 to 205,000 lbs., with 180,000 to 185,000 lbs. on drivers. Cylinders, 22 in. x 30 in.; diameter of drivers, 55 in.; straight radial stayed boiler with a working steam pressure of 200 lbs.; 375 to 380 2 in. tubes, 14 ft. long; firebox, 120 in. long x 40 to 41 in. wide. The tender will have a capacity of 6,000 gallons of water and 10 tons of coal.

The Chesapeake & Ohio, as reported in our issue of January 26, has ordered one eight-wheel simple switching locomotive from the American Locomotive Company. These engines will weigh 171,175 lbs.; diameter of cylinders, 21 in. x 28 in.; diameter of drivers, 51 in.; wagon top boiler, with a working steam pressure of 200 lbs.; total heating surface, 2,737 sq. ft.; 351 Shelby steel tubes, 2-in. in diameter x 14 ft. long; firebox, 80 in. x 70 in.; tank capacity, 5,000 gallons of water and seven tons of coal. The special equipment will include the Westinghouse air-brakes, Golmar bell ringer, Franklin magnesia boiler lagging, Climax couplers, Hancock injectors, Chesapeake & Ohio standard journal bearings, Jerome and Elliott piston rod and valve packings, Consolidated safety valves, Leach sanding devices, Nathan sight feed lubricators, and Latrobe driving wheel tires.

The Chicago Junction, as reported in our issue of Feb. 2, has ordered five simple six-wheel (0-6-0) switching locomotives from the American Locomotive Co., for June delivery. These locomotives will

weigh 142,500 lbs.; cylinders, 20 in. x 26 in.; diameter of drivers, 50 in.; working steam pressure, 180 lbs.; heating surface, 2,315.15 sq. ft.; 279 National tubes, 2 in. in diameter and 15 ft. long; firebox, 65½ in. x 62¼ in.; grate area, 28.15 sq. ft.; tank capacity, 5,000 gallons of water, and coal capacity, eight tons. The special equipment includes: Westinghouse air-brakes, Golmar bell ringers, Franklin boiler lagging, National-Hollow brake-beams, Perfecto brake-shoes, Tower couplers, Monitor injectors, Jerome metallic piston and valve rod packings, Consolidated safety valves, Watters sanding devices, Pittsburg Spring & Steel Co.'s springs, Ashcroft steam gages and Midvale driving wheel tires.

The Cincinnati, New Orleans & Texas Pacific, as reported in our issue of Jan. 26, has ordered five simple consolidation (2-8-0) locomotives from the American Locomotive Co., for September delivery. These locomotives will weigh 199,875 lbs., with 176,750 lbs. on the drivers; cylinders, 22 in. x 30 in.; diameter of drivers, 56 in.; straight boiler, with a working steam pressure of 200 lbs.; heating surface, 3,517 sq. ft.; 437 Detroit steel tubes, 2 in. in diameter and 14 ft. 6 in. long; carbon steel firebox, 108 in. x 72½ in.; grate area, 54 sq. ft.; tank capacity, 6,000 gallons of water, and coal capacity, 12½ tons. The special equipment includes: Westinghouse air-brakes, Simplicity bell ringers, Keasbey & Mattison magnesia boiler lagging, Buffalo metal brake-beams, Perfecto brake-shoes, Tower couplers, Schroeder headlights, Monitor injectors, Ajax journal bearings, Jerome piston and valve rod packings, Hayden safety valves, Potts sanding devices, Chicago sight-feed lubricators, Pittsburg Spring & Steel Co.'s springs, Ashton steam gages, standard driving and truck wheel tires, and cast-steel wheel centers. Other specialties are: Walschaert valve gear on one locomotive.

The Chicago, Rock Island & Pacific has ordered 33 simple consolidation (2-8-0) locomotives from the Baldwin Locomotive Works, and, as reported in our issue of Jan. 26, 11 simple Pacific (4-6-2) locomotives from the American Locomotive Co. The consolidation locomotives will weigh 201,000 lbs., with 180,000 lbs. on the drivers; cylinders, 22 in. x 30 in.; diameter of drivers, 63 in.; extended wagon top boiler, with a working steam pressure of 185 lbs.; heating surface, 2,923 sq. ft.; 340 National charcoal iron tubes, 2 in. in diameter and 15 ft. 6 in. long; Worth firebox, 107 in. x 67¼ in.; grate area, 50 sq. ft.; tank capacity, 7,000 gallons of water, and coal capacity, 15 tons. The Pacific locomotives will weigh 212,000 lbs., with 143,500 lbs. on the drivers; cylinders, 22 in. x 26 in.; diameter of drivers, 69 in.; extended wagon top boiler, with a working steam pressure of 200 lbs.; heating surface, 3,353.9 sq. ft.; 328 National charcoal iron tubes, 2 in. in diameter and 18 ft. 7 in. long; Otis steel firebox, 96 in. x 67¼ in.; grate area, 44.8 sq. ft.; tank capacity, 7,500 gallons of water, and coal capacity, 15 tons. The special equipment for both includes: Golmar bell ringers, Franklin boiler lagging, Buffalo brake-beams for consolidation locomotives, and National-Hollow brake-beams for Pacific locomotives, Major couplers, Hancock injectors, Magnus journal bearings, U. S. and Jerome piston and valve rod packings for consolidation locomotives, and U. S. piston and valve rod packings for Pacific locomotives, Consolidated safety valves, Leach sanding devices, Nathan sight-feed lubricators, Railway Steel Spring Co.'s springs, Ashcroft steam gages, and standard driving, truck and tender wheel tires.

The Great Northern, as reported in our issue of Dec. 22 last, has ordered 50 simple Prairie (2-6-2) locomotives, 20 simple Pacific (4-6-2) locomotives, 10 compound Atlantic (4-4-2) locomotives, and five compound Mallet locomotives from the Baldwin Locomotive Works. The Prairie locomotives will weigh 215,000 lbs., with 151,000 lbs. on the drivers; cylinders, 22 in. x 30 in.; diameter of drivers, 69 in.; Belpaire boiler, with a working steam pressure of 210 lbs.; Great Northern Ry. standard steel tubes, 2¼ in. in diameter and 18 ft. 6 in. long; Great Northern Ry. specification steel firebox, 127 in. x 67 in.; grate area, 59.3 sq. ft.; tank capacity, 8,000 gallons of water, and coal capacity, 13 tons. The Pacific locomotives will weigh 227,000 lbs., with 151,000 lbs. on the drivers; cylinders, 22 in. x 30 in.; diameter of drivers, 69 in.; Belpaire boiler, with a working steam pressure of 210 lbs.; Great Northern Ry. standard steel tubes, 2¼ in. in diameter and 21 ft. long; Great Northern Ry. specification steel firebox, 127 in. x 67 in.; grate area, 54.6 sq. ft.; tank capacity, 8,000 gallons of water, and coal capacity, 13 tons. The Atlantic locomotives will weigh 208,000 lbs., with 103,000 lbs. on the drivers; cylinders, 15 and 25 in. x 26 in.; diameter of drivers, 73 in.; Belpaire boiler, with a working steam pressure of 210 lbs.; heating surface, 3,439 sq. ft.; 300 steel tubes, 2¼ in. in diameter and 18 ft. 6 in. long; Great Northern Ry. standard steel firebox, 127 in. x 67 in.; grate area, 54.4 sq. ft.; tank capacity, 8,000 gallons of water, and coal capacity, 13 tons. The Mallet locomotives will weigh 335,000 lbs., with 316,000 lbs. on the drivers; cylinders, 23 and 35 in. x 32 in.; diameter of drivers, 55 in.; Belpaire boiler, with a working steam pressure of 210 lbs.; heating surface, 5,700 sq. ft.; 442 steel tubes, 2¼ in. in diameter and 21 ft. long; Great Northern Ry. standard steel specification firebox, 117 in. x 96 in.; grate area, 78 sq. ft.; tank capacity, 8,000 gallons of water, and coal capacity,

13 tons. The special equipment for all includes: Golmar bell-ringers, Sterlingworth brake-beams, Ross-Mehan brake-shoes, Tower couplers, Adams & Westlake headlights for Prairie and Mallet locomotives, Ohio injectors, Great Northern Ry. standard journal bearings, piston and valve rod packings, Ashton safety valves, Leach sanding devices, Detroit sight-feed lubricators, Simplex springs, Crosby steam gages, and Standard Steel Co.'s driving, truck and tender wheel tires.

CAR BUILDING.

The Atlanta & West Point will shortly be in the market for dining cars.

The St. Louis & San Francisco has ordered five postal cars from the Pullman Co.

The Virginia & Southwestern is reported as in the market for 500 coal and box cars.

The Mobile, Jackson & Kansas City is in the market for additional freight equipment.

The Central of Georgia, it is reported, is soon to be in the market for additional cars.

The Chicago, Rock Island & Pacific has ordered three dining cars from the Pullman Co.

The Toledo & Ohio Central is reported to be figuring on the purchase of 1,000 coal cars.

The Atchison, Topeka & Santa Fe has ordered two café cars from the Pullman Company.

The New York Central & Hudson River has ordered 55 trailer cars from the St. Louis Car Co.

The Chicago, Peoria & St. Louis is reported in the market for freight cars, including dump cars.

The Detroit, Toledo & Ironton, it is reported, will shortly be in the market for passenger equipment.

The Gainesville Midland is having three coaches and one combination car rebuilt by F. M. Hicks & Co.

The Norfolk & Western, it is reported, has ordered 3,000 hopper cars and gondola cars of 100,000 lbs. capacity each.

The Pennsylvania, it is reported, is building at its Altoona shops 100 specially designed cars for carrying automobiles.

The St. Louis, Rocky Mountain & Pacific has ordered 10 box cars of 60,000 lbs. capacity from F. M. Hicks & Co.

The Louisville & Nashville, it is reported, has placed orders with its own shops for the building of upwards of 2,000 cars.

The Midland Valley has ordered four cabooses from the Mt. Vernon Car Co. Address Henry Wood, Vice-President, Girard Building, Philadelphia, Pa.

The Hocking Valley has ordered 20 passenger cars from the Pullman Company, and, it is reported, will soon be in the market for additional box cars.

The British Columbia Electric Railway Company, New Westminster, B. C., is to build 17 passenger cars and 10 work cars in its New Westminster shops.

The Kanawha & West Virginia has ordered 40 gondola cars of 60,000 lbs. capacity from F. M. Hicks & Co., and is having three coaches rebuilt by the same company.

The Richmond, Fredericksburg & Potomac will build 100 box cars of 80,000 lbs. capacity each in its own shops at Richmond. The details of these cars have as yet not been settled upon.

The Camden Interstate Railroad Company, Huntington, W. Va., has ordered 10 interurban cars from the Jewett Car Company. These cars will be mounted on standard steel 0-50 trucks furnished by the car company.

The Lehigh & Hudson, as reported in our issue of Jan. 26, has ordered 250 hopper cars, and 10 low side gondola cars from the South Baltimore Steel Car & Foundry Co., and 100 box cars from the Standard Steel Car Co.

The Hudson Companies, New York, have ordered 50 passenger cars for the North River tunnel service. Forty of these are to be made by the American Car & Foundry Co., and the remaining ten are to be built by the Pressed Steel Car Co.

The Boston Elevated, as reported in our issue of February 2, has ordered 50 Brill groove posts semi-convertible cars from the J. G. Brill Co. The bodies of these cars will measure 33 ft. 4 in. long, and they will be 45 ft. 10 in. long over vestibules. The special equipment will include the "easy access doors." Thirty-seven of these cars are for use on the East Boston tunnel division, and will have steel bottom framing and the rest are for surface operation.

The Chicago & Alton, as reported in our issue of February 2, has ordered, it is reported, 200 refrigerator cars of 60,000 lbs. capacity each, from the American Car & Foundry Company for April delivery. These cars will be 40 ft. long over end sills, 9 ft. wide over side sills, and 7 ft. 5 in. high. The special equipment will include the American Steel Foundries bolsters, Damascus brake-beams, Climax couplers, Miner draft rigging, National Malleable Castings Company's journal boxes, and American Car & Foundry Company's wheels.

The Boston & Maine has ordered six café cars from the Pullman Company for July, 1906, delivery. These cars will have a capacity for 24 dining and 40 passengers. They will measure 72 ft. 6 in. long over end sills by 9 ft. 8 in. wide over side sills by 14 ft. 4 in. high. The bodies and underframes will be of wood. The special equipment includes National Hollow brake-beams, Westinghouse air-brakes, Magnus Metal Company's brasses, Gould couplers, M. C. B. standard journal boxes, Pintsch light, Gould steel platforms, Monitor roofs, Railway Steel Spring Company's springs, and Pullman vestibules and standard six-wheel trucks.

The Mexican Central, as reported in our issue of Jan. 19, is in the market for 750 box cars of 60,000 lbs. capacity, 160 single deck stock cars of 60,000 lbs. capacity, and 75 flat cars of 80,000 lbs. capacity. The box cars will weigh 31,500 lbs., and measure 37 ft. 6½ in. long, 9 ft. 7 in. wide, and 13 ft. 3 in. high, over all. The stock cars will weigh 29,500 lbs., and measure 34 ft. 10 in. long, 8 ft. 9 in. wide, and 12 ft. 7¾ in. high, over all. The flat cars will weigh 26,500 lbs., and measure 34 ft. 10 in. long, 9 ft. wide and 4 ft. 2½ in. high, over all. The special equipment for all will include: American Steel Foundries' bolsters, National-Hollow brake-beams, Westinghouse air-brakes, Mexican Central brasses, Tower couplers, Wagner doors for box cars, and Mexican Central doors for stock cars, Westinghouse friction draft rigging, Soule dust guards, McCord journal boxes, Sherwin-Williams paint, Mexican Central corrugated iron roofs for box and stock cars, Pittsburg Steel & Spring Co.'s springs and Mexican Central trucks.

The Great Northern has ordered 3,000 box cars of 80,000 lbs. capacity and 500 flat cars of 80,000 lbs. capacity from Haskell & Barker; 15 non-vestibule first-class coaches, 12 second-class coaches, and three dining cars from Barney & Smith; 10 combination baggage, mail and express cars of 60,000 lbs. capacity, 10 baggage cars of 60,000 lbs. capacity, and eight mail cars, as reported in our issue of Jan. 12, from the American Car & Foundry Co.; and 25 first-class coaches, as reported in our issue of Jan. 26, and 10 sleeping cars from the Pullman Co. The box cars will weigh 35,700 lbs., and measure 40 ft. 7¾ in. long, 9 ft. 1½ in. wide, and 12 ft. 9½ in. high, over all. The flat cars will weigh 27,400 lbs., and measure 40 ft. long, 8 ft. 6 in. wide and 3 ft. 9 in. high, over all. The non-vestibule first-class coaches will weigh 94,000 lbs. and the second-class coaches will weigh 93,350 lbs., both the non-vestibule first-class and second-class coaches will measure 60 ft. long, 8 ft. 10 in. wide and 9 ft. 6 in. high, inside measurements. The dining cars will weigh 56,000 lbs., and measure 54 ft. 2½ in. long, 9 ft. 9 in. wide, and 14 ft. 2 in. high, over all. The combination baggage, mail and express cars will weigh 106,000 lbs., and measure 73 ft. 8½ in. long, 9 ft. 10 in. wide and 14 ft. 2½ in. high, over all. The baggage cars will weigh 102,000 lbs., and measure 68 ft. 8½ in. long, 10 ft. ¼ in. wide, and 14 ft. 2 in. high, over all. The mail cars will weigh 56,000 lbs., and measure 54 ft. 2½ in. long, 9 ft. 9 in. wide, and 14 ft. 4 in. high, over all. The first-class coaches will weigh 117,750 lbs., and the sleeping cars will weigh 121,000 lbs., both first-class coaches and sleeping cars will measure 72 ft. 6 in. long, 8 ft. 10 in. wide, and 9 ft. 6 in. high, inside measurements. The special equipment for box and flat cars will include: Haskell & Barker steel bolsters and brake-beams, Great Northern Ry. brasses, Tower couplers, Haskell & Barker door fastenings, doors, draft rigging, dust guards, journal boxes, inside metal roofs for box cars, steel trucks and wheels. The special equipment for the rest of the cars will include: American Steel Foundries bolsters, National-Hollow brake-beams, Great Northern Ry. solid brasses, Tower couplers, Forsyth curtain fixtures and Pantasote curtain material for non-vestibule first-class, second-class, dining, first-class and sleeping cars; Great Northern Ry. standard draft rigging, Harrison dust guards, Haskell & Barker journal boxes, Pullman paint, Standard Steel Car Co.'s platforms for non-vestibule first-class, second-class, dining and first-class coaches, and Pullman platforms and seat for sleeping cars; Simplex springs, Great Northern Ry. standard trucks, Pullman vestibules for second-class, dining, first-class and sleeping cars, and Standard Steel Car Co.'s wheels.

BRIDGE BUILDING.

BRAZIL, IND.—Bids are wanted February 9 for building an iron bridge in Clay County.

BROOKLYN, N. Y.—Bids were recently opened by the Brooklyn

(N. Y.) Grade Crossing Commission for a large number of steel railroad and highway bridges to be built on the line of the proposed Brighton Beach improvements. The lowest bid for the bridges was from Milliken Brothers, of New York, and for the fences from the Wayne Iron Works, of Philadelphia. The road will run about four miles on an embankment, and one and one-half miles in a cut.

CARTHAGE, TENN.—Bids will be asked some time this spring by L. A. Ligon, Mayor, for building a steel bridge 500 ft. long, across the Cumberland river, to cost \$50,000. W. M. Johnson is County Clerk.

CHESTER, S. C.—Bids are wanted by J. O. Darby, County Supervisor, for building a small steel bridge over Sandy river, in Chester County.

CLAY CENTER, NEB.—Bids are wanted February 13 by the Board of County Commissioners, for all the bridges that may be wanted in Clay County for one year. W. F. Griess is County Clerk.

EASTPORT, ME.—The Washington County Railroad has commenced placing a draw in the bridge which crosses the channel separating this place from Perry, Me.

FALL RIVER, MASS.—A bill has been introduced in the State Legislature providing for a new commission to build a bridge to replace the present Slade's Ferry Bridge. It is proposed that the New York, New Haven & Hartford Railroad shall pay 60 per cent. of the cost, other electric roads 10 per cent., and the balance to be paid by the city of Fall River, by Bristol County, and by a number of other towns which will be benefited by the new structure; the remaining 30 per cent. not to exceed \$500,000.

FLORIDA.—On February 1 the United States Senate passed the bill, previously passed by the House of Representatives, authorizing a bridge across the navigable waters of St. Andrew's Bay, Florida. (Feb. 2, p. 36.)

HALLISON, N. C.—Bids will be asked early in the summer by the County Commissioners for putting up a steel bridge 600 ft. long, over Deep river, in Moore County. Gilbert McLeod, of Carthage, can give information.

LEBANON, O.—Bids are wanted February 28, at the County Auditor's office, for building a steel bridge, 175 ft. long, over Little Miami river, at Morrow, in Warren County. Walter Hinkel is County Surveyor.

LOUP CITY, NEB.—Bids are wanted March 6, by C. F. Beushausen, County Clerk, for building all the bridges that may be needed in Sherman County for one year.

MOBILE, ALA.—On January 29 the House of Representatives passed the bill, previously passed by the United States Senate, authorizing the Mobile Railway & Dock Company to build a bridge or viaduct across the water between Cedar Point and Dauphin Island in Mobile Bay.

NASHVILLE, TENN.—Residents are agitating the question of building two new bridges over the Cumberland river, one at Jefferson street and one in the central part of the city. The County Court at its April meeting will be asked to decide whether they shall be built or not.

OLIVET, S. DAK.—Bids are wanted April 3, by J. W. Wipf, County Auditor, for putting up a number of steel bridges in Hutchinson County, each from 40 ft. to 150 ft. long, over the James river.

OSHKOSH, WIS.—The Lake Superior & Southern will ask bids early this spring for putting up a number of bridges on its proposed road, from Huron Bay on the Northern Peninsula of Michigan southwest, via Lake Michigan. George A. Young, of Oshkosh, Wis., is Construction Engineer.

PARKERSBURG, W. VA.—Bids are being asked by C. H. Shattuck, President of the Parkersburg, Marietta & Interurban Railway, for building an iron bridge 2,500 ft. long, to carry street car tracks over the Little Kanawha river. W. E. Stout is County Clerk.

PENNSYLVANIA.—The United States Senate on February 1 passed the bill, previously passed by the House of Representatives, extending the time for commencing construction of a bridge across the Monongahela river, by the Counties of Washington and Westmoreland, Pa. (Feb. 2, p. 36.)

SELKIRK, MANITOBA.—The Canadian Pacific is considering plans for building a steel swing bridge over the Red river, which is about a half mile wide at this place.

SHARPTOWN, DEL.—Residents of this place are agitating the question of building a bridge over the Nanticoke river.

SHREVEPORT, LA.—A bill extending the time for commencing construction of a bridge across the Red river by the city of Shreveport, La., was passed by the House of Representatives on January 29, and by the United States Senate on January 31.

SPRING GREEN, WIS.—Bids are being asked by R. F. Mercer

for building a steel drawbridge, to cost about \$16,000, over the Wisconsin river. Charles Junge is County Clerk, Baraboo, Wis.

TORONTO, CAN.—The City Engineer estimates the cost of a bridge to connect Wellesley street with Sparkhall street, over the Don Valley, at between \$150,000 and \$200,000.

WAYNE, NEB.—Bids are wanted February 20 by Charles W. Reynolds, County Clerk, for some steel bridge work.

YANKTON, S. DAK.—On January 29 the House of Representatives passed two bills, both previously passed by the United States Senate, extending the time for commencing and completing combined railroad, highway bridges across the Missouri river at this place, one to be built by the Yankton, Norfolk & Southern Railway Company, and the other by the Winnipeg, Yankton & Gulf Railroad Company. (December 29, 1905, p. 207; January 19, p. 20.)

Other Structures.

BIRMINGHAM, ALA.—Bids are asked February 2 for building the proposed union passenger station for the Birmingham Terminal Company.

GUADALAJARA, MEX.—Plans have been approved by the government officials for the proposed central station for La Electra, S. A., of Guadalajara, at a cost of about \$300,000, and which will take about one year to complete. The Chief Engineer is Manuel de la Mora.

HATTIESBURG, MISS.—Plans, it is reported, are being made by the Mississippi Central to put up large car shops at this place.

JOHNSON CITY, TENN.—The Southern, it is said, is about to let a contract for building a new passenger station at this place.

LOS ANGELES, CAL.—The Southern Pacific is planning to put up a large freight house, with rooms to hold general offices, to cost about \$200,000.

NEW YORK, N. Y.—The Long Island road has bought 50 acres of land near Hunters Point, which will be used for a site for a large freight yard. The plans which have been filed show that a creek running through the property is to be widened to 150 ft. and dredged to a depth of 40 ft., and stone bulkheads will be built on each side. About \$200,000 will be spent for tracks and new buildings.

TRENTON, N. J.—The Pennsylvania, it is reported, has completed plans for putting up a freight house and office building three stories high.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA WESTERN.—See Illinois Central.

ALASKA RAILROAD.—Andrew F. Burleigh, of New York, who represents a syndicate, is in Washington seeking a subsidy for a railroad from Cordova into the interior of Alaska.

AUGUSTA & COLUMBIA.—Application has been made by a company under this name, in South Carolina, for a charter to take over the Augusta-Aiken Electric Railroad, operating 23 miles of road connecting Augusta, Ga., and Aiken, S. C., and to build 52 miles of road to Columbia; also for permission to operate the entire line with either steam or electric motive power. It is proposed to enter Columbia over the Seaboard Air Line bridge.

BALTIMORE & OHIO.—An officer writes that there is no truth in the report that this company will build an extension of its Valley branch to connect with the Norfolk & Western, nor will the company build a line paralleling the Southern between Strasburg and Harrisonburg. Negotiations are in progress with the Southern by which the B. & O. will be able to run through trains from Harper's Ferry, where the Valley branch connects with the main line of the B. & O., to Lexington, Va., instead of making the change at Strasburg as at present. (January 26, p. 28.)

BESSEMER & LAKE ERIE.—The Western Allegheny branch of this road, which originally extended from Kaylor to Queen Junction, is to be extended, it is said, eastward from Kaylor to East Brady, where connection is to be made with the Buffalo & Allegheny Valley division of the Pennsylvania. Work is under way from Rosepoint west to Newcastle, a distance of eight miles. At Rosepoint, a large steel viaduct 900 ft. long and 100 ft. high over Slippery Rock creek has just been completed. The road is to be ultimately extended from Newcastle to Youngstown and Girard, Ohio.

BOSTON & RHODE ISLAND ELECTRIC.—An officer writes that this company, which was recently incorporated in Massachusetts, is to build an electric line from Boston through Hyde Park, Foxboro, Mansfield, North Attleborough, and Attleborough to Providence. Charles H. Blood, of Fitchburg, is interested. (January 26, p. 28.)

CANADIAN PACIFIC.—This company, it is reported, will build a

branch from its line near Woodstock, N. B., southwest to Bancroft, Me., about 28 miles.

This company has been authorized by the Dominion Government to build an additional line through to Georgian Bay from Peterboro. This will give the company another terminal on the upper Canadian lakes. The new line runs right through Grand Trunk territory.

CARDENAS & JUCARO.—This company, which operates about 185 miles of railroad in Cuba, is building an additional 38 miles.

CARUTHERSVILLE & WESTERN.—A charter has been granted this company, in Missouri, to build a railroad from Caruthersville to Derring, in Pemiscot County, a distance of 12 miles. The offices of the company will be at Caruthersville, and the incorporators include J. M. Blower, of Chicago, and H. C. Schultz and S. F. Reynolds, of Caruthersville.

CENTRAL CALIFORNIA TRACTION.—Bonds have been issued by this company to secure funds to build its proposed road from Stockton, Cal., to Lodi and Woodbridge. Eight and one-half miles of track has been laid in Stockton.

CHARLESTON, PARKERSBURG & WESTERN.—An officer writes that this company, which was recently chartered in West Virginia, will build a railroad from Charleston, W. Va., north via Sissonville, Spencer and Elizabeth to Parkersburg, a distance of 60 miles. The line has been located for a distance of eight miles, and contracts are to be let this year. A. S. Alexander is President and C. P. Peyton, Chief Engineer, both of Charleston, W. Va. (January 19, p. 21.)

CHICAGO & SOUTHERN TRACTION.—This company is planning to operate an electric line from Chicago to Kankakee, 56 miles, and proposes to take over the Chicago Electric Traction.

CHICAGO, BURLINGTON & QUINCY.—This company has filed amended articles of incorporation in Wyoming. It is understood that the Burlington will not use its Alliance-Guernsey branch as a main line through Wyoming, but will extend its Holdrege-Cheyenne line west through southern Wyoming to Salt Lake City. Branches from a point on this line near Laramie, south to connect with the Denver-Lyons line, and north to a connection with the Frannie-Thermopolis now under construction south toward the Wind River Indian Reservation, would fill out this general scheme of development. The Guernsey line could then be extended to a connection with the Denver-Frannie north and south line in Wyoming at a point in the coal and iron fields about 50 miles north of Laramie, and eventually southwest to a connection with the main line running from Holdrege through Cheyenne and southern Wyoming. With the completion of this work the Burlington would have direct connection from Denver to the Pacific northwest, and also from the east to Salt Lake City.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—See Indianapolis & Louisville below.

CUBA EASTERN.—In connection with this road there has been organized the Northeastern Cuba, to build an extension of 65 miles in Santiago County, starting from the present eastern terminus at La Maya on the Ponupo branch and running through a section at present without railroad facilities.

DELAWARE, LACKAWANNA & WESTERN.—An officer writes concerning the proposed cut-off, to be built by this company between Delaware, N. J., and Portland, Pa., that surveys are being made to determine the most feasible route for bettering the grade. The line is being run by way of the Stanhope-Netcong meadows. The distance is about 20 miles. Nothing has as yet been determined upon. (December 29, p. 207.)

This company is asking bids on a double track through Bergen Hill. The tunnel is to parallel the present tunnel at about 50 ft. between centers. We understand bids will be closed February 17.

DOVER & SOUTH BOUND.—This company, it is said, has rails ready to be laid on the extension of the Dover & South Bound. Work is under way from the present southern terminus at Richlands to a point on the Atlantic Coast line between Wilmington and Goldsboro.

ERIE.—Bids are asked for building a four-track road through Bergen Hill, Jersey City, N. J., to parallel the present two-track tunnel. An open cut is to be made through the rock of Bergen Hill, with an average depth of 70 ft. and about 4,500 ft. long. The material excavated is to be moved to the west end to form embankments for passenger connections to existing lines operated by the Erie. There will be about 120,000 cu. yds. of earth and 480,000 cu. yds. of rock to be excavated, and 15,000 cu. yds. of concrete masonry to be built. A company to be known as the Penhorn Creek has been incorporated to build this short line.

ILLINOIS CENTRAL.—Announcement is made by W. J. Harahan, of this road, that the contract for building the new line between Corinth, Miss., and Haleyville, Ala., about 80 miles, has just been

let. The cost of the work will be \$5,000,000, and the contract calls for completion of the extension by January 1, 1907. The Alabama Western was incorporated by I. C. interests some time ago to build this extension. Contracts reported let to C. D. Smith & Company, of Memphis, Tenn., and to John Scott & Sons, of St. Louis, Mo., for building 42 miles of this line from Corinth, Miss., south. The contractors have opened an office at Corinth, Miss., and they will sublet some of the work, which is very heavy.

INDIANA HARBOR.—This company has opened its line from Indiana Harbor, near Chicago, south to Danville, Ill., a distance of 108 miles. Grading has been completed on the branch from Indiana Harbor southeast to Dune Park, Ind., 18 miles, and track will be laid shortly.

INDIANAPOLIS & LOUISVILLE (C. I. & L.).—An officer writes that grading contracts have been let to Williams & MacRitchie; to the Pound Construction Company, and to Thomas Glynn, for building this company's lines from a point on the main line of the Chicago, Indianapolis & Louisville one mile north of Quincy, Ind., southwest through Cataract, Jordan, Patrickburg, Clay City, Howellsville and Midland, to Victoria on the Illinois Central. Work is to be commenced at once, and other contracts will be let shortly. Maximum grades will be 0.9 per cent. There will be two steel bridges. L. W. Parker is President, and W. A. Wallace, Chief Engineer, both of Chicago.

INTERBOROUGH (NEW YORK CITY).—It is announced that by March 1 the express trains of the Subway will be run as far north as the Ship Canal, thus giving through service from the Battery to American League Park. The three-track road is now complete up to the Kingsbridge station of the New York & Putnam division of the New York Central at Bailey avenue, the Bronx. Until the bridge over the canal at 225th street is completed the terminal will be at 215th street. The first station north of the present terminal at 157th street is 167th street, St. Nicholas avenue, and Broadway, directly opposite the entrance to American League Park. The tracks there are 110 feet underground, and the station and tunnel were hewn out of solid rock. The station has been built to handle big crowds, and two elevators, with capacities of 100 persons each, will carry passengers to the surface. Subway tickets will be put on sale at the box office windows at the ball park to avoid congestion at the subway ticket offices when people are going home from a game.

KETTLE VALLEY.—Surveys are being made by this company for an extension from Grand Forks, B. C., to Franklin, a distance of 40 miles, and work is to be started early in the spring.

MIDLAND AIR LINE RAILWAY & NAVIGATION.—This company, recently organized in Arizona, to build a railroad from Des Moines, Iowa, to Port Arthur, Tex., has filed its incorporation papers in Iowa. It is claimed that the company has secured about 80 per cent. of the right of way from Texas to the Missouri line, and is negotiating for the balance. The company is incorporated for \$1,000,000. J. W. Crawford, J. O. Bleaksley, J. N. Brown and D. F. Keeler, of Lamoni; M. L. Temple, of Osceola, and A. W. Davis and M. C. Betts, Pleasanton, Iowa, are incorporators.

MONTANA, TABOR & EDMONTON.—Incorporation has been asked by L. M. Johnson, of Lethbridge, Alberta, for a company under this name, to build a number of branch lines from the international boundary through that Province.

NEVADA NORTHERN.—An officer writes that the line of this proposed road is from Cobre, Nev., a point 140 miles west of Ogden, south to Ely, a distance of 138 miles. Grading has been completed for 70 miles and 17 miles of track laid. The road is being built to carry copper from the mines around Ely, and is owned by the Nevada Consolidated Copper Co. The contractor for this work is the Utah Construction Company, of Ogden, Utah. The work will be light, maximum grades being 0.7 per cent., and maximum curvature six degrees. The company is planning to build 10 miles of road connecting the mines with the smelter. This work will be much heavier than that on the main line. It is expected to have the road completed about May 1, and the branch to the mines about July 1. (January 12, p. 13.)

NEW YORK, OKLAHOMA & PACIFIC.—A charter has been granted a company under this name in Arkansas to build a railroad from Rogers, Ark., west to Folsom, N. Mex. The company is capitalized at \$20,000,000, and will have its general office at Alva, Okla. T., and Rogers, Ark. The proposed route is from Rogers to Prior creek and Claremore, Ind. T., thence through Hominy, Bliss, Lamont, Jefferson, Alva, Beaver City, and Mineral City to Folsom, N. Mex. The proposed road will traverse the coal fields of Indian Territory, the wheat belt of northern Oklahoma, and reach the copper mining section of New Mexico.

NORTHEASTERN CUBA.—See Cuba Eastern above.

PENNSYLVANIA ROADS.—Charters have been granted in Pennsylvania to the following companies, of all of which Edison Ripley, of Sherman, N. Y., is President: Northern Middlesex Street Rail-

way; Chenango Northern Street Railway; Midland Street Railway; Central Newcastle Street Railway; Chenango Street Railway, and the Newcastle Northern Street Railway.

RIO GRANDE, SIERRA MADRE & PACIFIC.—An officer writes that the proposed extension of this road will run from Nueva Casas Grandes, Mexico, southeast to Santa Maria Valley, up this valley and south through Gafiana, El Valle, Cruces, Namiquipa, Santana and Temosachile to San Pedro, through a timber section owned by W. C. Greene, of New York, a distance of 180 miles. Fifty miles of the work will be heavy. The maximum grades will be 1 per cent. There will be four steel bridges and five tunnels. W. C. Greene, New York, is President, and J. P. Hallehan, of El Paso, Tex., Chief Engineer. (January 19, p. 31.)

ST. LOUIS MANUFACTURERS' RAILWAY.—According to a St. Louis newspaper, the lines of this company are to be extended so as to make a St. Louis entrance for the Kansas City Southern. The principal business of the road at present is switching and transfer service, and it is controlled by interests connected with the Anheuser-Busch Brewing Association. Adolphus Busch is President. According to the report, the brewers are dissatisfied with their existing railroad connections, and they propose to branch out in such a way as to have competition in all directions. They propose to bridge or tunnel the Mississippi so as to connect with the railroads terminating at East St. Louis; and in the other direction their plans do not stop short of the Gulf of Mexico and, apparently, Puget Sound.

SOUTHERN OF ALBERTA.—Incorporation has been asked for by a company under this name, in Alberta, to build a number of railroads in that Province. J. J. Hill is said to be back of this project.

SOUTHERN RAILWAY.—This company, it is reported, has asked bids for building yards at Cumberland Gap. The work includes the laying of five miles of track, also building a round-house and a new turn-table.

SPARTANBURG & NORTHERN.—Announcement has been made by this company that its proposed road will be built from Spartanburg, S. C., to the North Carolina state line, where connection will be made with the South & Western, now under construction from the coal fields of Kentucky, Tennessee and Virginia. Application for a charter for the S. & N. is to be made at Columbia, S. C., by Ralph K. Carson, of Spartanburg, who is attorney for the road, and who has been securing rights-of-way. G. L. Carter, of the S. & W., is President.

SUGAR CREEK & NORTHERN (W. & L. E.).—An officer writes that this proposed road will be almost an air line from Bolivar, Ohio, northwest to Orrville, via Sugar Creek, a distance of 26 miles. Contracts are to be let this week, and work will be commenced at once. The maximum grade will be 0.4 per cent. The work includes the building of several large bridges over Tuscarawas river and Sugar creek. F. A. Delano, of Chicago, is President; B. A. Worthington, Vice-President; H. T. Douglas, Jr., Chief Engineer, both of Pittsburg.

SUSQUEHANNA CENTRAL.—A charter has been granted this company, in Pennsylvania, with a capital of \$1,000,000, to build 100 miles of railroad through Clearfield, Center and Clinton Counties, Pa. James K. Gardener, of Ridgeway, is President.

TAMPA NORTHERN.—Under this name a company has applied for a charter in Florida to build a railroad from Tampa north. Financial arrangements are said to have been made and the first 45 miles of road is to be built at once. Contracts are being let for the material needed for construction. It is supposed that the road will cross the state line into Georgia and form a connection with the Atlanta, Birmingham & Atlantic. Benjamin Thompson, of Tampa, is Chief Engineer.

WHEELING & LAKE ERIE.—See Sugar Creek & Northern above.

RAILROAD CORPORATION NEWS.

ATCHISON, TOPEKA & SANTA FE.—Potter, Choate & Prentice, New York, are offering at 96 and interest \$1,250,000 adjustment 4 per cent bonds of 1995. This block is part of an authorized issue of \$51,728,000, and makes \$51,346,000 now outstanding. They are secured by a mortgage upon nearly all the property of the A., T. & S. F., being subject only to the \$146,634,500 general mortgage 4 per cent bonds outstanding.

ATLANTIC COAST LINE.—The gross earnings for the half year ended December 31 were \$11,524,970, an increase of \$1,020,150, and net earnings \$3,859,869, an increase of \$91,546.

BUFFALO, ROCHESTER & PITTSBURG.—The gross earnings for the six months ended December 31 were \$4,589,491, an increase of \$401,408; net earnings \$2,145,250, an increase of \$404,215.

CENTRAL OF GEORGIA.—This company has sold to Blair & Company, New York, \$1,020,000 4½ per cent. equipment notes.

CHICAGO & ALTON.—The gross earnings for the six months ended December 31 were \$6,230,203, a decrease of \$451,263; net earnings \$1,964,411, a decrease of \$559,928.

CHESAPEAKE & OHIO.—This company has sold to Kuhn, Loeb & Company \$4,000,000 first mortgage 4 per cent. guaranteed bonds of 1944, of the Big Sandy Railroad Co. The proceeds of the sale will be used to redeem the C. & O. 5 per cent. collateral notes maturing April 4, 1906, which were secured chiefly by the above Big Sandy bonds.

CHICAGO, CINCINNATI & LOUISVILLE.—The President of this company says that the earnings are now sufficient to meet operating expenses, and that the line is earning as much as it did when it was leased to the C., H. & D.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—The gross earnings for the six months ended December 31 were \$4,032,506, an increase of \$312,797; net earnings \$951,831, an increase of \$92,424.

ERIE.—The gross earnings for the half year ended December 31 were \$25,859,990, an increase of \$2,107,454; net earnings were \$7,858,689, an increase of \$480,406.

ILLINOIS CENTRAL.—The gross earnings for the half year ended December 31 were \$25,319,222, a decrease of \$551,381; net earnings \$7,626,167, a decrease of \$1,158,536.

LEHIGH VALLEY.—The gross earnings for the six months ended December 31 were \$17,472,248, an increase of \$1,768,132; net earnings \$7,227,676, an increase of \$678,211.

LONG ISLAND.—Kuhn, Loeb & Company, New York, have bought \$4,500,000 refunding 4 per cent bonds of 1949. These are part of an authorized issue of \$45,000,000, of which \$17,891,000 are outstanding. They are guaranteed by the Pennsylvania and will be used to pay for construction.

NEW YORK, NEW HAVEN & HARTFORD.—The shareholders of the Naugatuck R. R. have voted to sell the entire property to the N. Y., N. H. & H. The Naugatuck consists of 57 miles of road between Naugatuck Junction, Conn., and Winsted, and four miles between Watertown and Waterbury. The N. Y., N. H. & H., which owns three-fourths of the \$2,000,000 capital stock, will assume all liabilities and pay \$6,016,575 cash, being \$300 per share plus accrued dividends.

NEW YORK, ONTARIO & WESTERN.—The gross earnings for the six months ended December 31 were \$4,023,779, an increase of \$364,311; net earnings, \$1,225,150, an increase of \$69,157.

NORFOLK & WESTERN.—Brown Brothers & Company, Philadelphia and New York, have bought \$3,000,000 divisional first lien and general mortgage bonds of 1944, making \$11,000,000 now outstanding of the \$35,000,000 authorized. The proceeds will pay for improvements on the Cincinnati division. The same bankers have also bought \$3,000,000 equipment trust certificates, being series D, E and F of this issue. Series A, B and C, previously sold, amounted to \$3,800,000. The new certificates are secured by 23 locomotives and 2,800 cars, now under construction or being delivered.

The gross earnings for the half year ended December 31 were \$13,886,878, an increase of \$2,108,588; net earnings \$5,584,327, an increase of \$812,156. The average mileage operated was 1,834, an increase of 65 miles. The largest proportionate increase in expenses was in maintenance of way; the operating ratio, 60 per cent., is the same as last year.

PENNSYLVANIA.—The gross earnings of the lines east of Pittsburg for the year ended December 31 were \$126,760,212, an increase of \$16,730,200; net earnings, \$38,860,762, an increase of \$5,142,800. The lines west, directly operated, show increases of \$2,021,200 and \$2,139,500, respectively, in gross and net earnings.

PENNSYLVANIA COMPANY.—Kuhn, Loeb & Company, New York, have bought \$20,000,000 collateral trust 4 per cent. bonds, issued by the Pennsylvania Company, and guaranteed by the Pennsylvania Railroad Company. The proceeds of the sale of these bonds will be used to pay for construction already carried out, and to be carried out during 1906.

ST. LOUIS & SAN FRANCISCO.—Hallgarten & Company, New York, have bought \$3,300,000 4 per cent. refunding bonds of 1951, making \$63,404,000 now outstanding of the \$85,000,000 authorized. Of the \$3,300,000, \$3,300,000 will be used to retire \$2,050,300 6 per cent. second mortgage. Series A, B and C, maturing November 1, 1906, and the remaining \$1,000,000 is the amount available this year for improvements under the terms of the mortgage.

SOUTHERN.—The gross earnings for the half year ended December 31 were \$26,604,444, an increase of \$1,674,610; net earnings \$8,016,681, an increase of \$406,135.

WHEELING & LAKE ERIE.—The gross earnings for the six months ended January 31 were \$2,900,293, an increase of \$578,245; net earnings \$829,981, an increase of \$28,810.

